COAL FIELDS of Southwestern Pennsylvania

Washington & Greene Counties

By JOHN W. BOILEAU

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COAL FIELDS

OF

SOUTHWESTERN PENNSYLVANIA

WASHINGTON AND GREENE COUNTIES

Fields of Coking Coal located in eastern Greene and southeastern Washington Counties, Pennsylvania, owned and largely controlled

by

MR. J. V. THOMPSON

(Price $10.00)

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PREFATORY NOTE

The object of this volume is to inform the various interests as to the true merit of the coal fields of southwestern Pennsylvania, and more particularly of the coking coal situation.

The Connellsville coal field has had its quick rise in both output and great merit of product, and the rapid depletion of its areas makes necessary the looking to other fields.

Nearby is the territory of eastern Greene and southeastern Washington Counties, and because of its geological, economical and commercial location it can well be called the greatest undeveloped coking coal field in America. With the Pittsburgh vein of coal, together with its close proximity to the thousands of mills in Ohio and Pennsylvania, the true situation is easily observed.

Coal is the staple article and the advantageously located supply of coking coal gives us assurance of our future industries for some time to come.

The statements herein given are based upon the accuracy of the information given from sources that there is every reason to believe authentic. An effort has been made to bring out the facts as to the supply of fuel, present output, and probable future needs; and as to this territory in particular.

Mr. J. V. Thompson, with his successful experience in coking coal and keen foresight as to its future, has purchased thousands of acres in eastern Greene and southeastern Washington Counties. The information given herein certainly substantiates the wisdom of acquiring these large holdings. Time will prove their great worth just as it did with the purchases made by Mr. Frick, Mr. Thaw, Mr. Rainey, and many others in the old Connellsville field; and the result was millions of gain in values originating in developing nature's greatest product—coal, and the making of it into coke.

The writer is under obligations to the following for letters published herein. They have greatly aided the writer in showing how the coking coal fields of eastern Greene and eastern Washington Counties are regarded by the leading and successful coal and iron interests. The courtesies are much appreciated:

Mr. Frank M. Osborne, Ex-President of the Pittsburgh Coal Company, President of the Youghiogheny & Ohio Coal Company, with their many mines and large holdings in western Pennsylvania, eastern Ohio and West Virginia; also of the Tower Hill Connellsville Coke Company.

Mr. John H. Jones, President of the Pittsburg-Buffalo Company, with their large and varied interests in western Pennsylvania and West Virginia.

Mr. Frank Hitchcock, President of the Andrews & Hitchcock Iron Company of Youngstown, Ohio.

To Mr. H. A. Kuhn, President of the Pittsburgh-Westmoreland interests, am greatly indebted for much of the valuable data given herein, also letter as to their holdings.

Mr. F. C. Keighley, President of Coal Mining Institute of America and General Superintendent of the coking interests of the Oliver & Snyder Steel Company, has placed the writer under great obligations for the many suggestions offered, his review of the history of the coking coal region, and the ably prepared article printed herein, on coke industry in southwestern Pennsylvania.

Mr. W. R. Calvary, General Superintendent of the Ellsworth Coal Company, very kindly gave the writer statements as to the operations at Ellsworth, together with many analyses.

The undersigned is also indebted to Mr. Baird Halberstadt, the geologist, for use of map; to Mr. N. P. Hyndman for use of Rainey map. Mr. A. Bement and the Peabody Coal Company for table showing the various coal measures in western Pennsylvania and Ohio. Also Mr. John Fulton, our well-known mining geologist, for information and suggestions given, and the table of analyses called "Fulton's." Mr. A. O. Tinsman for prices and conditions existing in early history of old Connellsville region.

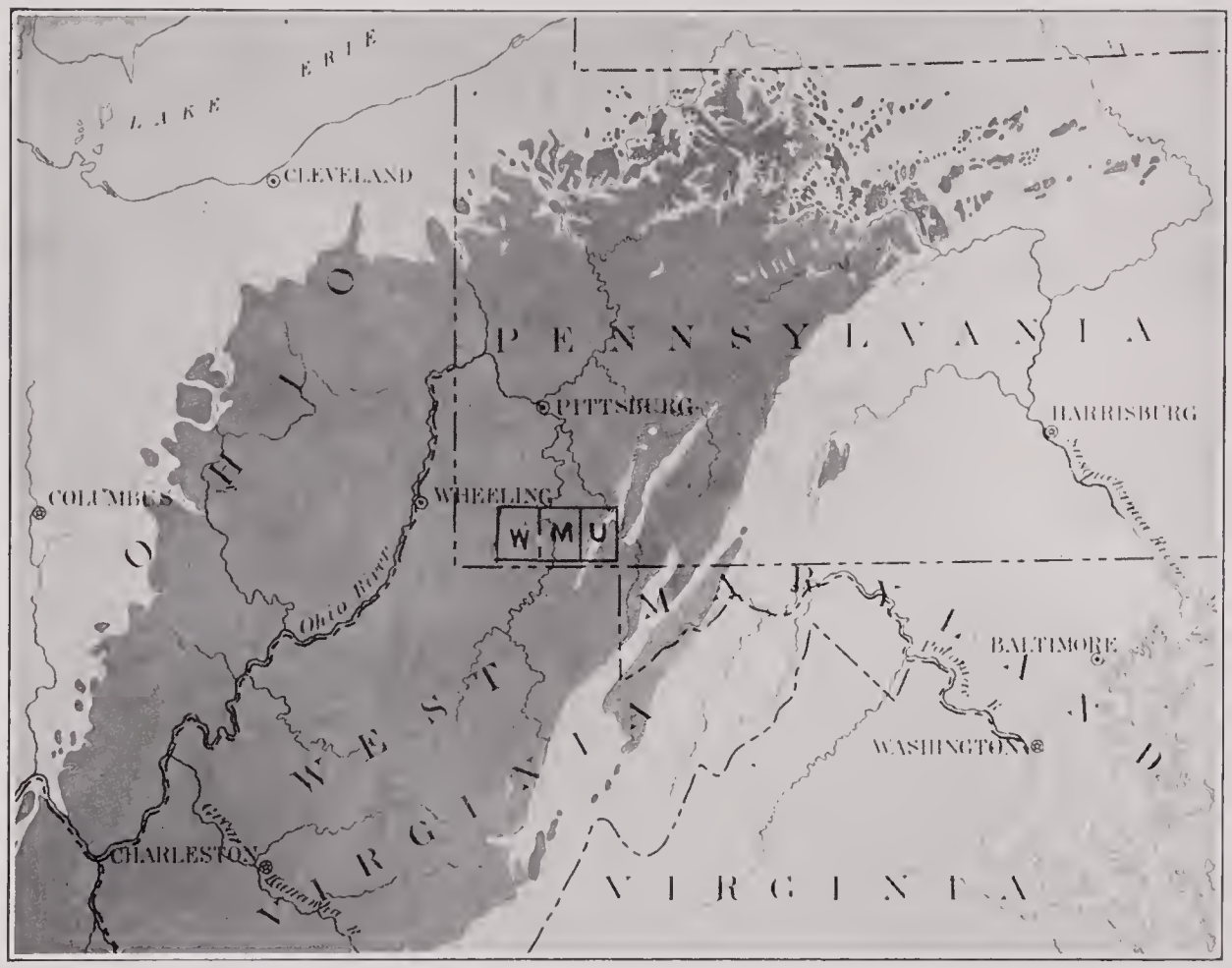
The writer is greatly indebted to the United States Geological Survey. Such able assistants as E. W. Parker, M. R. Campbell, and many others, have produced invaluable results of great benefit to our many industrial interests.

The article by Mr. L. W. Fogg is the result of broad experience and good reasoning.

If there be a desire to corroborate what has been said, the undersigned would be glad to afford the opportunity.

JOHN W. BOILEAU.

Pittsburgh, Penna., August 15, 1907.



Map showing the extent of the northern part of the Appalachian coal field.

The position of Waynesburg, Masontown and Uniontown quadrangles within the coal field, is shown by rectangles.

Map showing the area of Pittsburgh coal in Pennsylvania. Masontown and Uniontown quadrangle is situated on its eastern border.

The Waynesburg quadrangle is situated wholly within the field.

DISTRIBUTION OF COAL FIELDS AND MARKETS

There is what is termed the Appalachian coal field proper, which extends from Northern Pennsylvania into Alabama. It is a narrow strip West of the Allegheny Mountains and extends west to the Hocking Valley district and into eastern Kentucky and Tennessee.

The western half of Ohio and eastern half of Indiana is practically without coal. There is about half of the lower peninsula of Michigan that has coal measures. About one-third of Indiana and the major portion of Illinois, two-thirds of Iowa, and half of Missouri, has coal measures. Texas, Indian Territory, have coal, but quality and quantity is uncertain. In many instances a good quality is to be had.

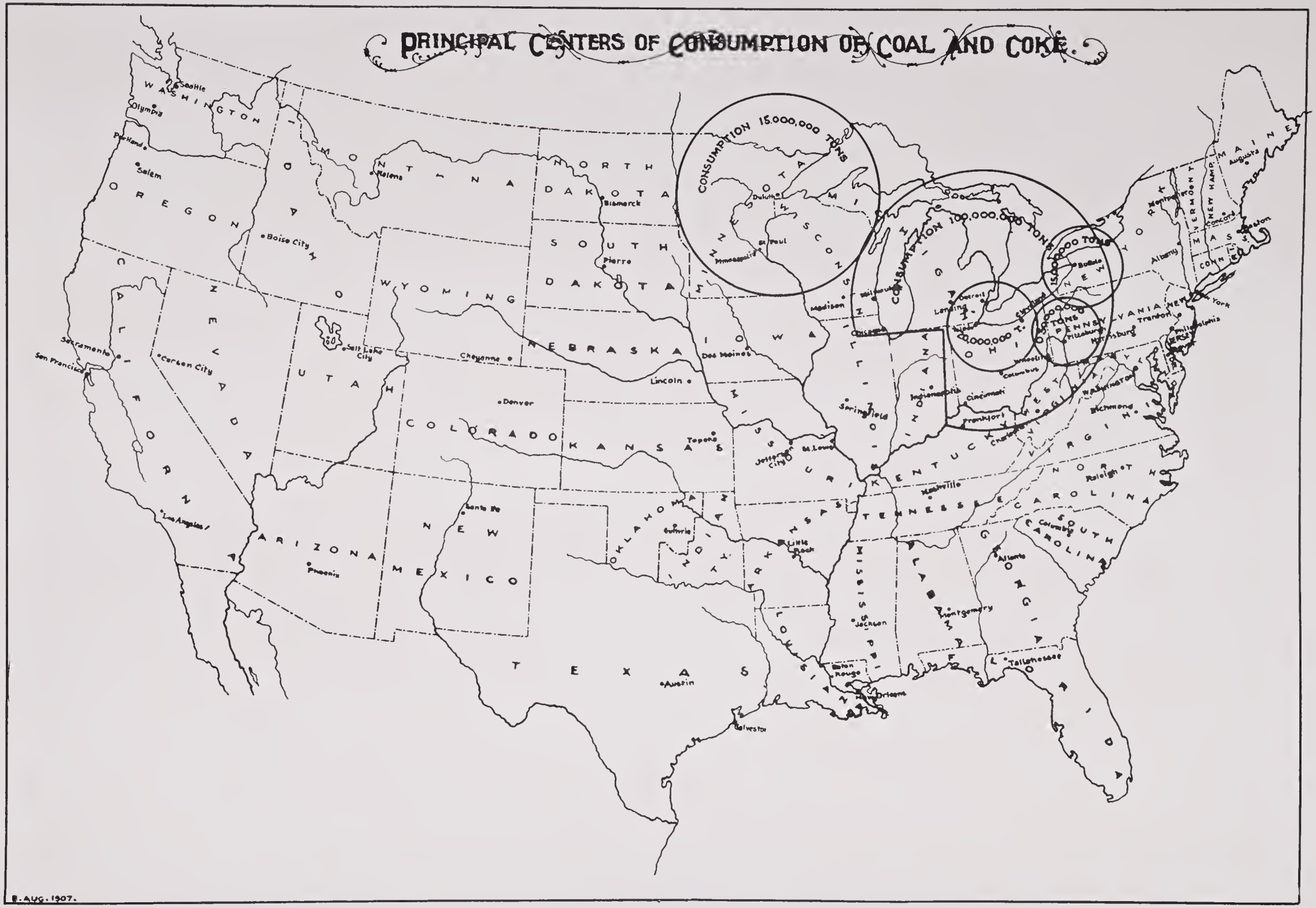
About one-tenth of Nebraska and one-fourth of Kansas is underlaid with coal measures Then we go West for several hundred miles. Colorado has great fields of coal, but in the main they are inaccessible and are only available for Colorado and points within a reasonable freight rate distance. This is true of New Mexico. Montana has large areas of coal.

Of our large coal areas it is a hard question to say how much is available for profitable and economical mining.

While we have large coal areas it may be noted that transportation costs and transportation facilities limit the area of distribution of fuel obtained from any one source of supply. Southwest Pennsylvania coal fields are having the heaviest demands on their supply of any state in the Union.

The Pittsburgh vein of coal in Southwestern Pennsylvania, and the part near the Pennsylvania-West Virginia line in the latter state, the Freeports in northern West Virginia, the Cambria-Indiana fields, the Pocahontas fields, the eastern Kentucky, northern Alabama and other fields all have their markets for their coke product. From any of these latter points a heavy freight rate would prevail in reaching our Pennsylvania and eastern Ohio mills.

PRINCIPAL CENTERS OF CONSUMPTION OF COAL AND COKE.



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INCREASED CONSUMPTION AND BROAD MARKETS FOR FUEL

With the disappearance of the continually diminishing supply of natural gas, the increased consumption of coal should be large. Producer gas, through manufacture from coal, will aid to supply the needs. It will make a further inroad upon the supply of coal. The coal industry and its probable future is a very interesting subject in all its phases. The geologist and engineer who locates the coal, the initial steps in opening up the mine, the making arrangements in tipple and mine, the carrier, the railroad, the markets, production and consumption, the various laws, rules and regulations governing its shipment, the different uses to which it is placed, results to the benefit of industry and the comfort given to the world and its people all make a deep and valuable subject for consideration.

There are many steel companies and industrial plants along the river and river front in the Pittsburgh district and for many miles up the Monongahela, Youghiogheny and Allegheny Rivers. These manufacturing interests get their supply of coal and coke by either river or rail, water transportations being far the cheaper, and with the Greene County water front of more than 25 miles, this transportation advantage alone is a great point in favor of Greene County coal. Because of this advantage the river interests supply a large percentage of all the coal consumed by the manufacturing interests on all the rivers in the vicinity of Pittsburgh.

RESULT

Mr. Frick, Mr. Rainey and others in the coking field laid the basis for their acquiring fortunes by purchasing lands containing coal suitable for the manufacture of coke. The great increase in the value of lands is observed. Where a few years ago coal acreage in Fayette County sold for $25 per acre, at the present time coal similarly located cannot be bought for less than eighty to one hundred times that amount. This is accounted for mainly by the great growth in the iron and steel business and the developments of our other natural resources. Our bridges, railroads, buildings, etc., are of steel and iron.

The Fayette Fields to-day disclose the fact of but little acreage undeveloped or on which development is not proposed.

COKING COAL

Our resources are great and comparatively little developed in culture, mining, etc. A continued expansion in the use of iron and steel for railroads and buildings and otherwise, certainly means increased demand for coke. Good coke, produced as cheaply as possible, is necessary in order to not, as is the case in Great Britain, make in many instances fuel too high to be economically advantageous.

The Pittsburgh coal bed is the proper one to adhere to. Chemical experts are building machinery that will crush poorer qualities of coal, which by washing and handling, can eliminate in a way part of the impurities, and in some instances with the thick vein seam, the cost of handling has been reduced to a desired figure. The cost has been counted in latest methods at from five to twelve cents per ton owing to the advantages to be had. If the poorer seams of coal were used, and especially where there is great unevenness of bed, it would be at even a higher cost than the above, while a thick and regular bed could be handled at the minimum amount named. It has been proven frequently that some of the thin vein coals,

and other than the Pittsburgh-Connellsville bed, have produced a better coke as far as an analyses is concerned, but they are lacking in the physical qualities required; they do not have the strong structure and quick combustion at the same time.

It is the general belief that coke from the Pittsburgh-Connellsville bed excels the Pocahontas coal because the latter does not hold up in the furnace and admit of blast as well as the former. The chemical end of the situation cannot wholly determine its usefulness. Then again the transportation would make Pocahontas coal costly for use in Pittsburgh mills.

The old territory of the Pittsburgh bed is of great worth, the various fields having especial merits owing to the physical conditions they have been subjected to. Most of Southwestern Pennsylvania, and in Greene and Washington Counties, the covering is generally thick, the various strata from crop or drifts several hundred feet in thickness.

This is a coke era. Coke will certainly continue as a necessary and economical factor in the iron, steel and other metallurgical operations, as with the widening of the future in these coke will surely go along with them. It certainly was of the greatest benefit to mankind that the great beds of fuel were stored up in the way of energy for his future needs.

In a way charcoal served a similar purpose, but in twenty years or less our great forests will have become depleted. With no wood for fuel, charcoal has had its period for smelting, and with the disappearance of our forests, our great water falls will in part or main lose their usefulness to mankind. Instead of being regular, because of the effect forests have on the regularity of the flow of water, they will be barren and only periodically may the water fall be used.

WIDENING OF THE COKE SITUATION

The extraordinary demands for coke have brought into prominence many fields, some that have made coke of merit, and some that have made coke in a smaller way because of the Connellsville region being able to take care of all requirements. The Connellsville region has been pressed to the limit, and most of the outside product has found a market. There is much good coke produced in other places than in the original Connellsville belt. From Alabama to Northern Pennsylvania the bituminous coal beds extend. The coke in the Fairmont District, that of the Pocahontas Fields, has no difficulty in finding purchasers. The Connellsville coke is the furnace fuel par excellence. There is other coke that is acceptable. Pocahontas coal is chemically pure enough to suit the iron maker, but it is irregular because of the irregular conditions under which it is found, deposited and mined. All these conditions give promise for the coal of Eastern Greene and Eastern Washington Counties. It foreshadows its future, and with the demand for iron and steel continually increasing, no longer can the railroads hesitate in developing this territory. In Eastern Washington it has already been tapped and big days are close at hand. The manufacture of coke is far from reaching its limit in the Pittsburgh coal seam region of Southwestern Pennsylvania.

COKE AND THE EASTERN GREENE COUNTY FIELD

There are cokes that contain an injurious quantity of sulphur but are merchantable even if they slightly exceed one per cent. Many manufacturers of iron and steel are using cokes, and have used coke, of a much higher percentage of sulphur. But the analyses shown herein proves this field to be the most valuable coking coal district.

The first coke ovens were built at Connellsville in 1841, only sixty-six years ago.

The amount and nature of the impurities in the way of ash, sulphur, phosphorus, together with the amount of carbon, volatile matter and ash, including their physical makeup, all determine the coking qualities. In other words, it is the physical and chemical makeup that changes the results.

The reason that Connellsville coke is better than any other is that the physical structure and hardness of body of the coke is such as is desired. It is quite true that many of the coals are purer, but they are lacking in the physical structure, one of the main elements which is necessary, no matter how pure the coal may be. Without this, it will not serve its purpose in the furnace.

Another thing that will aid in developing successfully the field will be close attention given to the making of the coke. This is also necessary to having a coal that is chemically satisfactory. The Pittsburgh coal bed is the most regular strata in the world. There is but little coal lost through faults, change in quality, etc. Quite different from the Southern regions, where both change in quality and loss in thickness of bed is of frequent occurrence. The coke in the Pocahontas field may be chemically purer than the Connellsville, but it does not have the physical requirements in strength and appearance; it takes more pounds of coal per ton of coke than the Connellsville.

The scarcity of coking coals of merit compared with the amount of other fuel is of great importance to the future of Pittsburgh. The most accessible region will be Eastern Greene County. The coke made from this bed has good weight, firmness and appearance, and it is difficult to distinguish it from Connellsville coke, and in structure has the power to carry the burden in the furnace.

Coke can be produced so as to be made a perfect locomotive fuel. The Boston & Maine Railroad in 1899 changed more than fifty locomotives by placing in water grates; the change being in the use of coke which is dustless and smokeless. On the run between Boston and Portland there was hardly a handful of ashes, where in burning coal at least three bushels would remain. The cost of coke was about the same as bituminous coal, while the advantages of it were numerous. If the roadbeds were oiled and coke used as fuel, passenger service would be as clean as on electric roads. Then, again, many savings are made because of fires resulting from sparks. This coke, as a locomotive fuel, is only made possible through the by-product process; the cost would be prohibitive otherwise. Bituminous coal requires constant firing where coke only requires re-firing every 10 or 15 miles.

GREENE COUNTY COAL CERTAINLY A COKING COAL

In looking at the extent of the celebrated Pittsburgh coal bed, together with its national reputation for coking, steaming, gas making and domestic purposes, we observe that part of it which is available for coke.

Looking at the map, showing the area of the Pittsburgh coal in Pennsylvania, the available coal for future output may be analyzed as follows:

In southern Allegheny County the Pittsburgh bed has many outcrops, and much of its area has long been depleted. As it is, all the large interests have acquired it almost in total. The same with the long narrow blocks shown in Westmoreland County—but little coal for sale. All

are aware of the scarcity of coal lands in Fayette County. The coal in the northern and western half of Washington County is not coking coal under present methods in general use, leaving the southeastern quarter with the known results as to its merit. The future of western Greene County is undetermined. This leaves us, out of all this large extent of coal measures, the eastern half of Greene County practically undeveloped, and movement upon this territory is already begun. There are the developments of the Jones interests at Zollarsville; the Bessemer interests between Millsboro and Clarksville; the Pittsburgh & Westmoreland interests above Ten Mile village; the Dilworth Coal Company at Rice's Landing; the Gilmore Coke Company in Muddy Creek valley and adjoining Andrews & Hitchcock Iron Company, and nearby, in the Muddy Creek district, the Youngstown Sheet & Tube Company. All of the above propose erecting coke ovens. With such explanation as this, it is certain that the centre of coke-making will move more closely to and within Greene County borders.

The Pittsburgh coal bed on account of its thickness, its regularity, its availability, its high grade and its adaptability for the production of coke and gas has long been the most famous bituminous coal seam in the United States. This particular high grade part of bed is restricted to the southwestern part of the State under conditions named in above paragraph.

All the above named counties are pretty well in the same strata as far as the coal measures are concerned, but the different sections are classed as to the material or class of coal existing. Near Pittsburgh it is steaming fuel; in the Monongahela-Webster basin it is a gas coal because of high percentage of volatile matter, and when southern Washington County and Fayette are reached it is a coking coal. With not too great a difference, one would answer the purpose of the other.

GREENE COUNTY COKING COAL

The coal of eastern Greene and eastern Washington Counties is identical geologically with the Connellsville seam. Physically and chemically there is but little difference. From western Fayette County through Greene County, the seam is without any abrupt interruption, and the same continuous strata is to be had on the Greene County side as on that of Fayette County. When the bed was deposited the amount of vegetable matter, also the physical conditions, may have caused a slight difference in the quantity of the various component parts entering into the make-up of the coal, and at the same time the Connellsville bed as observed in the fracture of the coal may have been subjected to slightly more heat, and in the one some of the component gases may have been retained, while in the other they were allowed to partially escape.

But eastern Greene and eastern Washington County coal shows sufficiently high in carbon to make good coke. The vegetable bed was of the same deposit, and while after conditions and influences may have caused slight change, making both a slight variation chemically and physically, chemically in a slight way, and physically as seen in the bed, the Connellsville coal having different fracture from the laminated bed of the west side of the River,—although when crushed comes out in the same form as that of the Connellsville coal,—cubular in form; although same physical results, specific gravity about the same. However, but little of it will need to be crushed for coke making. With the exception of slight change the coal across the river is just as good as Connellsville coal, and in many instances examination has shown it to be superior in quality, having smaller ash and lower percentage of phosphorus and about the same sulphur. The explanation of its being high in volatile matter is because of the heavy vegetable bed and its thorough submergence, together with the highly bituminized condition because of thick covering over same and remoteness from centers of disturbances. The Greene County coal is available for coke making.

That portion of Greene County from Ruff's Creek District east to river, south through Jefferson to Muddy Creek, and continuing south toward State line, is regarded, as to location and

COAL MEASURES OF NORTHWESTERN PORTION OF THE APPALACHIAN COAL FIELD

WESTERN PENNSYLVANIA AND OHIO				COAL MEASURES IN OHIO			
Prof. J. D. Dana's Table of Formations	Table of Second Geological Survey of Penna.	Names Provisionally Adopted by Prof. J. P. Lesley	Geological Number of Series	Names of Coal Seams in Western Penna.	Coal Seams Recognized	Numbers employed to designate Seams	Local Names of Seams
Upper Coal Measures	Upper Barren Measures 1,000 to 1,200 Ft.	Greene County Group 300 to 400 Ft.	XVII	Windy Gap Ninevah Dunkard			
		Washington County Group 700 to 800 Ft.	XVI	Jollytown Washington A Washington Little Washington Waynesburg B Waynesburg A			
	Upper Productive Coal Measures 350 to 450 Ft.	Monongahela River Group 350 to 450 Ft.	XV	Waynesburg Uniontown	Waynesburg	8-b or 11	Macksburg
				Sewickley	Sewickley	8-a or 10	Meigs Creek
				Redstone	Redstone	9	
				Pittsburg	Pittsburg	8	Pittsburg

quality, excellent territory. Geologically it is a continuation of the Connellsville coal basin and its similarity chemically and physically, not only renders it more than an average coking coal and demonstrates that it is a coking field of first rank.

The location of eastern Greene County coal, together with its quality, gives it prestige over any coal outside the Pittsburgh district.

GEOLOGICAL

The more perfect conditions under which coal is developed and operated, such as persistency of beds, unlimited areas of high grade coal and nearness of market, together with the quality, determine the basis of coal values.

The physical condition of coal depends upon existing conditions when deposited, similar to that of stones,—a free stone or a sand stone. In the former, the slimes or finer sediment have been deposited under a naturally quieter condition, while the coarse sandstone is made when more disturbed conditions and larger particles of silica, drift, etc., were present.

Our lower measures were formed first. Then a luxuriant growth of vegetation sprang up, followed by its submergence, and then a deposit of various clays, rocks and shales, and after a period of another growth, another submergence, etc., until the upper Freeport, which was larger than any previous vegetable bed, was formed. We note in the lower measures effect from the drift period, a more irregular bed in both quality and physical condition. After the vegetable bed was deposited which made the upper Freeport and with its subsequent submergence, there was a long sub-aqueous period in which at least five hundred feet of deposit in the way of clays, shales and sediment; then a greater mass of vegetation formed and the Pittsburgh or Connellsville seam of coal was deposited. This was at a time when subsidence had become quiet,—thus the explanation of the persistency and evenness with which the Pittsburgh bed is formed; in many places the coal goes over the anticlines without even a break. There was no decided disturbances of the bed. The great Bellevernon anticline in some places shows a disturbance, but it is not proven general. Under such conditions the quality of coal could not be otherwise than perfect. The whole territory is necessary for the continuance of the supremacy of the Monongahela Valley in iron and steel industries. The different districts have their special merits owing to the physical conditions to which they have been subjected, whether it be increased pressure above, whether there is a deposit over the coal bed that preserved it, whether it be of shale, clay or freestone or sandstone,—all these would tend to change the physical and economical condition of the coal. Some were more completely submerged than others, thus making heavier strata over the bed; some allowed the component gases to escape, some allowed the impurities from the accumulation of strata above to seep down into the coal, and later after-influences in the way of erosion has had its effect.

During the accumulation of the Pittsburgh coal bed the luxuriant growth of vegetation was to be had, and during that part of the carboniferous period it was at its best. The Appalacian Basin was a comparatively level area, and the remarkable uniformity in conditions and the long duration of plant growth resulted in the formation of this magnificent area of coal. There were a few changes took place as the different layers of impurities represent by the partings in the coal. One can observe how uniform this was and how widespread in their extent, and forest growths finally ended by a broad submergence which caused the deposit of overlying shale and sandstone, and it is easily observed by the various cross sections that there is very little variation in Eastern Washington and eastern Greene Counties in the level of the Pittsburg coal bed.

From Chartiers Creek, where we find the Manifold mine, down to Ellsworth and Zollarsville, we find on the east side of this line many operations and many drillings that show the depth of bed, quality of coal and its thickness, and invariably prove the continuance of the good qualities of the Connellsville or Pittsburgh seam on its southwest course from Fayette County.

The thickness of the Pittsburgh coal bed is somewhat variable, but its structure is fairly constant throughout the entire region. The arrangement of the benches show the roof or draw slate, the breast coal, bearing-in-coal, brick coal and bottom coal. The breast coal and bottom coal are the portion of the seam mined for shipment. In the center of the lower division are two slate partings, separated by what is called the "bearing-in" coal.

One of the many remarkable things in connection with the vegetable beds is the various states of composition; one bed may be pure and the other impure. During the agitation brought about by the submergence, many a stream would wind its way through the same, cutting out the vegetable matter and leaving a sediment of clay or gravel or stone deposited in its place. This occurs in the lower beds of coal. In parts of Ohio it is frequently the case. A drift period existed.

The following information is taken from the U. S. Geological Survey:—

The Waynesburg quadrangle is almost wholly situated in Greene County. It extends into the southern part of Washington County and includes a small portion of Fayette County on the east side of the Monongahela River. It extends to within two miles of the north line of West Virginia and 15 miles of the east line of Ohio. It lies in the northern central portion of the Allegheny plateau. Within this quadrangle there are a few knobs and ridges that rise to a greater heighth than the surface of the plateau, but they are but little higher than the general level of the surrounding hills and in the main they are to the south of Waynesburg.

STRATIGRAPHY

The rocks which are exposed at the surface in the Allegheny plateau belong entirely to the carboniferous system; they include the Pocono, Mauch Chunk, Pottsville, Allegheny, Conemaugh, Monongahela formation, and the Dunkard group. They are named below in order of their age, beginning with the lowest:

Pocono Formation:—Pocono formation which is only reached in this quadrangle by drilling deep wells for oil and gas, and contains no workable beds of coal.

Mauch Chunk:—Mauch Chunk formation takes its name from Mauch Chunk in the anthracite coal region, where it is moved 2,000 feet thick in the deep synclines, and in western Pennsylvania it is exposed along the Conemaugh River and Chestnut Ridge Mountain. In the Waynesburg quadrangle it is represented by red shale, sandstone and limestone, with a total thickness and of the formation varying from 125 to 250 feet.

Pottsville Formation:—Pottsville formation is exposed in eastern Pennsylvania, while in the western part of the state the outcrop is seen at a point of great development in Mercer County.

Allegheny Formation:—Allegheny Formation, from which comes all of the bituminous coal mined in this state north of Pittsburgh and east of Connellsville and Blairsville, bears, besides several coal seams, valuable beds of fire clay, limestone, shale and iron ore. Because of the number of coal seams in this formation it is called the Lower Productive Measures.

Conemaugh Formation:—Conemaugh formation, which outcrops along the river of same name, is frequently called Lower Barren Measures on account of its stratigraphy and position and the absence in it of workable beds.

Monongahela Formation:—Monongahela formation overlies the Conemaugh in the southeastern part of the state, and extends from the bottom of the Pittsburgh coal below to the top of the Waynesburg above. Its thickness varies from 310 to 400 feet. It contains several coal beds of which the Pittsburgh seam is by far the most valuable and best known. It is much

less sandy and shaly than any of the other carboniferous formation, but contains, on the other hand, far more limestone, which constitutes more than one-third of its thickness.

Dunkard Group:—This group of rocks was formerly known as the Upper Barren measures and later as the Dunkard Formation. It lies above Monongahela Formation and includes the highest rocks of the carboniferous system found in this area, which has a thickness in the southwest corner of Pennsylvania of about 1,100 feet above sea level. It consists mainly of shale and sandstone and also contains beds of coal and limestone. The coal in this formation is generally worthless.

TOPOGRAPHY

There are several interstream areas that have not been brought down to the common level, as the period of erosion did not continue long enough to reduce them. The result is, there are several elevations and hills of a height of 1,500 feet above sea level.

DRAINAGE

Greene County has on its eastern border the Monongahela River for a distance of 24 miles. This river has been made navigable by a series of locks and dams; pools 5, 6 and 7 touch its border. The altitude of the surface of water in Pool 5, at Rice's Landing, is 746.4 ft. above tide.

The entire drainage of the Waynesburg quadrangle, or three-fourths of the area of Greene County, and the entire drainage of the eastern half of Greene County flows into the Monongahela River. The main streams are North Ten Mile, South Ten Mile, Muddy, Whitely and Dunkard Creeks. Ten Mile Creek carries away the water of fully one-half of the territory. All these streams afford a gravity line with very light grades, thus enabling the tapping of this territory along these streams by branches built from lines along the Monongahela River. The direction of the water courses cannot be ascribed to the present structure of rocks because it disregards anticlines and synclines alike. The South Fork of Ten Mile passes from Waynesburg syncline across the axis of the Bellevernon anticline, and then, swinging to the northeast, recrosses the same axis twice in the vicinity of Clarksville. Whitely Creek has its source near the crest of the Bellevernon anticline and crosses the Whitely syncline and meets the flank of the next anticline on the east at right angles. Dunkard Creek performs similarly.

SURFACE RELIEF

The surface of eastern Greene and Washington counties is decidedly hilly in all parts. By reference to the topographic map herein reproduced, elevations vary from 741.4 ft. on the river to 1,620 ft. in the western part of Perry Township. More than fifty hilltops reach an altitude of 1,500 ft. or more, while the flood plains of the main streams are less than 1,025 ft. above tide. The territory, by reason of its proximity to Monongahela River, have the lowest average altitude. This includes Morgan and Jefferson townships. The grade from Millsboro, via Clarksville, Jefferson and Waynesburg, in 18.4 miles is less than 10 ft. to the mile, or the water of Ten Mile Creek at Waynesburg is less than 184 feet above that at the river. The Muddy Creek Valley shows fair grade until Love's Hill is encountered. The same way with Whitely and Dunkard,—good grades until far back from the river.

DESCRIPTIVE GEOLOGY

Structure

On the sketch map (page 21) given herein the geology is shown by means of contour lines drawn on the floor of the Pittsburgh coal. Where the Pittsburgh seam shows any natural outcrop its altitnde has been determined, and where it crosses below the snrface its existing positions are known through the records of the many gas wells of the region. After its altitnde has been determined the points of equal altitude are connected by contour lines. This gives us the longitudinal and transverse contours of the troughs and arches, the dip of the beds, and the approximate height of the Pittsburgh coal above sea level. The topographical map (page 1) herein gives the surface heighth above sea level; hence at the various points it is easy to determine the depth of the Pittsburg coal below the surface.

These structures contours are only approximately correct, but in any case it is the belief that the correct depth is probably less than one contour interval, that is 50 ft. Over much of the area the variation is not more than 20 ft.

GEOLOGIC STRUCTURE

The general strnctural features of the four quadrangles are shown in Sketch map (page 21). In the Waynesburg quadrangle these have the more northeast and southwest strike that characterizes the whole Appalachian field. Fayette anticline has but little to do with Greene and Washington counties except to deflect the strata sharply to the west along Dunkard Creek. The Brownsville anticline gives a north and south course to the contour between Davistown and Whitely, cutting off the Lambert syncline and joining the Fayette anticline two miles east of Whitely Village near Willow Tree.

WHITELY SYNCLINE

This syncline (see map, page 21) lies between Fayette and Bellevernon anticline. The shape of the Whitely syncline is broad and shallow and dips toward the south. The axis of the trough lies on a line through Khedive, Fordyce and Kirby; hence the floor of the Pittsburgh coal should have a regular sloping bed.

The Bellevernon anticline is frequently called the Waynesburg anticline. Its axis crosses the Monongahela River at Bellevernon. It has been proven by the Geological Survey that the continuity of the fold continues through to points east of Waynesburg, but near there has decreased much in size, and even then the Bellevernon anticline is the most pronounced structural feature in Greene County. Where the Bellevernon anticline crosses the Monongahela River the Pittsburgh coal is at an elevation of 1,000 feet above sea level. At Blacksville, on the Pennsylvania-West Virginia state line, the same coal is little more than 400 feet above tide, probably the fold disappears soon after entering West Virginia. The eastern slope of the Bellevernon anticline in Jefferson Township is short and gentle. From the crest near the mouth of Braden Run to the bottom of the syncline at Fordyce and Khedive there is scarcely more than 200 feet. From the crest at the same point to the axis of the syncline to the west the Pittsburgh coal descends nearly 400 feet, while the western flank of the Bellevernon axis has a regular slope, as shown by contour line on the structure sheet.

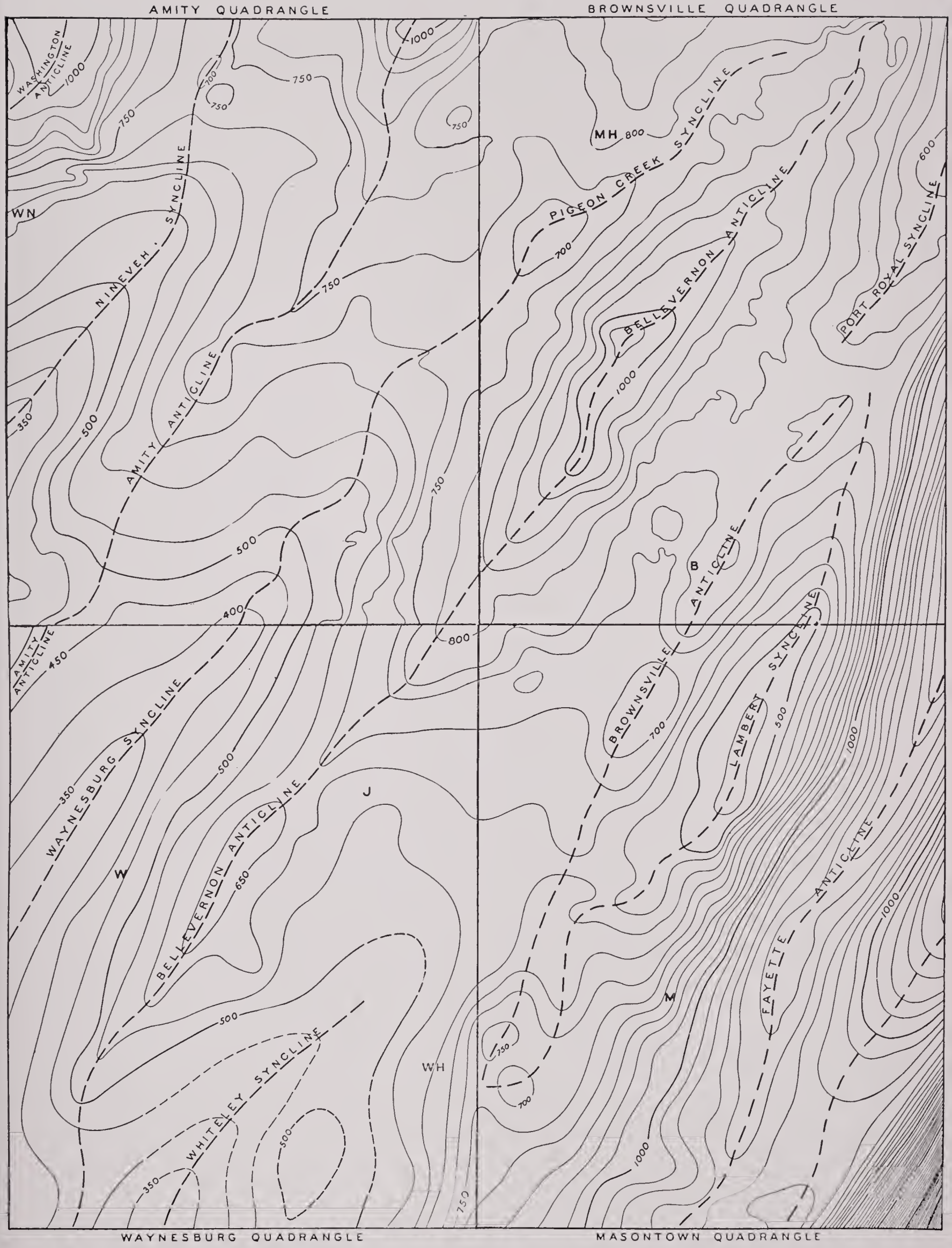
WAYNESBURG SYNCLINE

This structural basin lies west of the Bellevernon anticline. The Pigeon Creek and Waynesburg syncline might be one and the same, but mine data in the vicinity of Bentleysville, Washington County, seems to indicate cross structure, so that basin was given the local name of Pigeon Creek Syncline. On Pigeon Creek the Pittsburgh coal is 700 feet above tide, while the Wisecarver Run in this quadrangle is at least 400 feet lower; althongh this fall may be continuous from one point to the other, it is not known to be so, so it is best to use the local term—Waynesburg Syncline. The several wells drilled show the position of the Pittsburgh coal and mainly from the elevation of the Upper Washington Limestone.

AMITY ANTICLINE

From Ruff's Creek to Reese's Creek the rocks rise to the west more gradually than to the east, and the low anticline crosses the Northwestern corner in Morris Township through the Fonner oil field. This is frequently called the Pin Hook anticline. In Pennsylvania State report the axis has been traced from the northwest corner of Waynesburg quadrangle northward across Ten Mile Creek at Hackney and across the village of Amity in Washington County. According to well records the Pittsburgh coal is about 460 feet above sea level on the crest of the Amity anticline where it crosses the northern boundary of the quadrangle. its elevation is 420 feet at the road forks of the extreme northwestern corner of the quadrangle, and from 400 to 420 feet in the wells on the Dunn farm half mile farther north. On the crest of the anticline at Hackney, a little over three miles due north of Hope, the elevation of the coal is 495 feet. The rocks dip to the East so that the same coal was found 430 feet above tide in diamond drill holes at Bissell on Ten Mile Creek. For this reason the 450 feet contour line is shown swinging strongly to the east near Hope so as to pass closely to Ten Mile Village.

The Sketch Map shows the relation of the geologic structure in the Waynesburg and Amity quadrangle to that in the Brownsville and Masontown quadrangle.



WN, Washington; W, Waynesburg; J, Jefferson; WH, Whitely; M, Masontown; B, Brownsville; MH, Monongahela.

CROSS SECTIONS

The entire Monongahela formation is to be seen on the steep hillsides one mile below Rice's landing. The Waynesburg coal in the hill is 368 feet above the Pittsburgh coal bed; there the roof of the coal shows a coaly shale with the massive Pittsburgh sand stone above it.

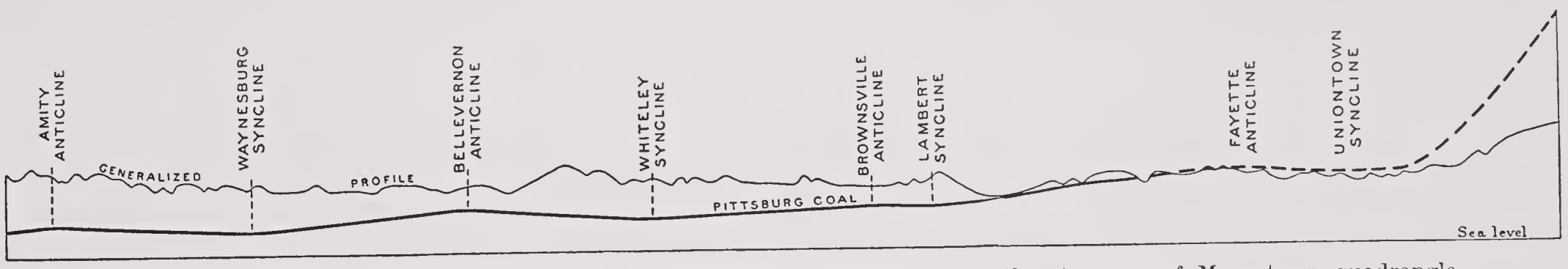


FIG. 3.—Cross section from northwest corner of Waynesburg quadrangle to southeast corner of Masontown quadrangle. Horizontal scale, 1 inch=$3\frac{6}{7}$ miles; vertical scale, 1 inch=3000 feet. FROM U. S. GEOL. SURVEY.

PITTSBURGH COAL

The Pittsburgh coal outcrops along Ten Mile Creek between Clarksville and the Monongahela River, and very close to the water level.

From an industrial and economic standpoint this coal is the most important member of the formations. It is more uniform in quality and thickness, and, for a given area, more valuable than any other bed in the bituminous field. The Pittsburg coal occurs in an area of about fifty miles in length by about 50 miles in width in the southwestern part of Pennsylvania. It is found throughout Greene and Washington counties and extends east into Fayette and north into Allegheny County and shows a thickness of from six feet to ten feet; south from Pittsburgh, as you approach the West Virginia line, the coal thickens, while west of Pittsburgh on the northwestern outcrop it runs from four feet to six feet in thickness. The drillings in eastern Greene and Washington counties show practically the same aggregate thickness it maintains in the outcrop on the edge of the field along the Monongahela River near Frederickstown and Millsboro and farther south along Dunkard. The Pittsburgh bed in this section is separated only in instances by coaly shale and a heavy slate from the massive Pittsburgh sandstone. Occasionally the roof of the coal is the sandstone, particularly so in along Dunkard Creek. This seam of coal is well known for its excellent quality throughout the entire district. In the Youghiogheny basin, in the vicinity of West Newton and Scott Haven, also in the Webster basin in the Monongahela River, it is a first class gas coal, and the coal for forty miles to the south of Pittsburgh up the Youghiogheny River is the standard fuel.

We need say nothing of the quality of Pittsburg coal as a steam and domestic coal. It is a great producer of illuminating gas and contains sometimes 36 to 38 per cent. of volatile combustible matter. For the manufacture of coke it has few, if any, equals in the United States.

The Pittsburgh coal as measured in this region shows at Rice's Landing below the roof coal and clay 7 feet 10 inches of coal. The coal in the Northeastern part of Greene County shows about 7 feet in thickness. It has been observed along the Monongahela River where the Pittsburgh coal is exposed at the surface, that in some places the overlying sandstone attains a very massive character and for a short distance cuts out the upper bench of coal, and the evidence of drillings show greater thickness than is exposed along Ten Mile Creek and the river. The coal on Dunkard Creek shows a thickness of 9 feet and upwards.

ANALYSIS IN EASTERN GREENE AND SOUTHEASTERN WASHINGTON COUNTIES

Many analyses have been made of the coal in southeastern Washington and eastern Greene Counties, and very good results are to be had. North of Ellsworth on Chartiers and Peters Creek, the sulphur may run one to two per cent. On Pigeon Creek it is nearly always less than 1%. From examination shown throughout the territory in question, the coal was valuable for coking, but west of the Pin Hook anticlinal and west of Rogersville the coal would be a steam or gas coal rather than coking coal, as the quality seems to somewhat deteriorate as you go west to the Ohio River. Mechanical handling and scientific methods might be used to perfect results.

The good chemical character of the coals in eastern Washington County is observed in the various analyses given herein. The average of ten samples taken from Fourth Pool mine on west side of the River including Vesta No. 1, Vesta No. 2, Allen, Champion, Eclipse, Forsythe, Vigilant, Crescent, Beaumont and Knob mines, show an average analysis of

Moisture	.648
Volatile Matter	32.994
Fixed Carbon	59.604
Sulphur	1.013
Ash	6.754
Phosphorus	.0176

The result of all analyses and examinations show that physically and chemically the eastern Greene and eastern Washington County coking coal indicates its adaptability for metallurgical and furnace use.

The Ellsworth coal and coke tests at the fuel testing plant at St. Louis showed:

	Coal.	Coke.
Moisture	2.91	0.23
Volatile Matter	33.70	1.19
Fixed Carbon	57.99	91.63
Ash	5.40	6.95
Sulphur	1.08	0.81

Analyses of dry coal from Ellsworth collieries and from coke made in a crucible from the same coal:

	Coal.	Coke.
Volatile Matter	37.92	1.08
Fixed Carbon	57.72	92.35
Ash	3.69	5.96
Sulphur	.67	.61
	100.00	100.00
Phosphorus	.0032	.0051

Analyses of Pittsburgh coal from the Ellsworth collieries:

	No. 1		No. 2	
Loss of moisture, air dried..		1.50		1.50
Moisture	1.22	2.91	1.05	3.01
Volatile Matter	36.28	33.70	36.65	33.46
Fixed Carbon	56.24	57.99	57.25	58.70
Ash	6.26	5.40	5.05	4.83
	100.00	101.50	100.00	101.50
Sulphur	.84	1.08	.91	.73
Calories				7,915
British thermal units.....	14,247			14,197

Ellsworth Laboratory under dates given made the following determination of coal and coke:

1907	Volatile Matter	Ash	Sulphur	Phosphorus
April 4th, Coal.....	26.50	9.42	1.35	.011
April 22nd, Coke.....		8.85	.95	.016
April 22nd, Coke.....		8.53	.89	.016
April 23rd, Coke.....		9.12	.95	.013
May 21st, Slack Coal.....	33.20	8.55	1.07	
May 27th, Coal.....	33.38	7.18	1.05	.016
June 21st, Coke.....		8.75	.96	.014
July 13th, Coal.....	33.01	8.06	1.19	.009
July 17th, Coke.....		10.22	1.04	.020
July 17th, Coke.....		9.10	.86	.010
July 24th, Coke..... ...		10.03	1.05	.017

The following miscellaneous analyses are given in territory as indicated by townships or farm location:

In every field there are always portions of it low and portions of it high in sulphur, and the different drillings given below and elsewhere show only the usual variance.

The core drillings, that have been made not far from the Washington and Greene County line in the vicinity of the H. P. Bailey farm, show a depth of 414.57 feet; thickness of coal 6.42 feet; sulphur 1.26% and phosporus .011%.

About one and one-half miles north a drilling in the vicinity of Margaret Johnston farm shows a depth of 435.33 feet; thickness of coal 6.42 feet; sulphur, 1.05% and phosphorus .009%. Continuing farther north three miles in the southern portion of South Franklin Township, near William & James Tucker farm, we find a diamond drill test hole record showing a depth of 641.67 feet; thickness of coal 6.17 feet; sulphur .79%, phosphorus .01%. South and to the west, a point about one and one-half miles north of Lone Pine, a diamond drill test shows, near J. W Closser farm, depth 370.75 feet; thickness of coal 6 feet; sulphur .82%, phosphorus, .009%; and to the south of these holdings, a distance of two miles, and about 2½ miles north of the Tucker farm, we find a depth of 589.5 feet; thickness of coal 7.33 feet; sulphur 1.23%, phosphorus .01%.

The analyses above given are along or near the Pin Hook anticline.

Going farther south, in the vicinity of Zollarsville and Clarksville, the following analyses are given:

	Horn Farm near Zollarsville	Near Clarksville	Adjoining Latter	Castile Run, near Breakiron farm	Near Rose Farm, back of Clarksville
Moisture	1.62	1.12	1.00	1.20	1.31
Volatile Matter		36.83	36.70	34.10	
Bitumen	29.85				29.74
Fixed Carbon	60.71	58.47	56.69	58.19	62.05
Ash	6.90	3.58	5.61	6.51	5.18
Sulphur	.92	.73	1.08	1.18	.92
Phosphorus	Trace.	.009	.003	.003	Trace.

	Miller Farm, near Zollarsville	In same territory	Grable Farm, northwest of Zollarsville
Moisture	.87	1.01	1.24
Volatile Matter	25.75	32.37	30.87
Fixed Carbon	65.04	58.12	60.96
Ash	7.32	8.50	5.93
Sulphur	1.01	1.07	.98
Phosphorus	.008	.011	.004

Analysis of coal located on Muddy Creek, near Khedive.
North of tract drillings show:

Volatile Matter	29.93
Carbon	59.90
Ash	8.90
Sulphur	.71

Farm	Co.	Twp.	Depth coal	Thickness	Volatile Matter	Fixed Carbon	Ash	Phosphorus	Sulphur
J. W. Closser,	Greene,	Wash.	719	5.17	30.07	59.40	7.50	Trace.	1.63
Stone King,	Greene,	Cumberland	557	8.50	29.93	59.97	8.60		0.71
Perry Fox,	Greene,	Perry	429	8.17	30.16	58.61	9.05		0.98
Chas. Hughes' Farm,	Greene,	(Ruff's Creek)							
At Lippencott,				7 ft.					1.00

Analyses across River from Greene County side:

	Moisture	Vol. Matter	Fixed Carbon	Ash	Sulphur	Phosphorus
Core hole at East Riverside, Fayette Co.	.87	33.59	57.34	8.20	1.76	
2 Samples, 1 mile north of East Riverside on Jacobs' Property	.87	30.36	57.62	10.03	1.12	Trace only
2 Samples, Gates mine, American Steel & Wire Co.	1.12	31.36	60.12	6.30	1.08	.002
Samples from 5 to 16 inclusive. From core holes located on Vernon Heirs, VanKirk and Henshaw properties	.81	28.45	62.93	7.03	.776	.008
		34.575	55.11	10.515	.66	.005
		35.205	56.97	7.852	.81	.009
	.97	34.02	56.72	8.29	1.08	.006
		33.00	57.30	9.70	.60	.018
		35.75	56.39	7.09	.77	.013
		36.73	55.30	7.97	1.03	.008
	.98	32.68	55.50	10.06	.60	.007
	.82	35.25	56.56	7.35	.78	.007
	.29	34.53	54.64	10.54	.673	.011
	.53	35.19	56.95	17.33	.867	.009
	.43	35.87	54.89	8.81	1.029	.011
	.65	34.65	55.86	8.84	1.20	.001

Fulton's table shows chemical composition of coal:

	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur
Pittsburgh,	1.28	38.10	54.39	5.44	.79
Connellsville,	1.25	31.79	59.80	7.16	.60

Below is Fulton's Analyses of Standard Appalachian Coking Coal:

	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur
Pennsylvania,					
Bennington,	1.73	23.89	67.03	6.69	.66
Connellsville,	1.26	31.79	59.79	7.16	.60
West Virginia,					
Monongah,	1.52	37.96	53.27	6.03	1.22
Pocahontas,	.69	19.96	73.02	5.67	.66
Kentucky,	1.80	32.34	60.10	5.10	.66
Tennessee,	1.50	32.51	59.33	5.82	.84
Alabama,	1.65	32.48	60.15	4.82	.90

Among Fulton's axioms are:

"It requires a hotter oven to secure the best results in coke when using broken coal than it does when using run-of-mine coal."

"The coarser the coal, the heavier the coke, and the finer the coal, the lighter is its coke; the purer the coal, the lighter is the coke. This is self evident, as the impurities of the coal are mainly heavier than pure coal."

"These experiences are from the practice of coking in the Connellsville seam. Other regions will require special studies to secure the best results in coke produced."

"Where impurities exist in the coal, it should have a preparation for coking by crushing and washing."

PROPERTIES OF COKE

Fulton says: "The main requirement is to determine the nature of the physical and chemical properties that are most desirable in coke for blast furnace use, and to meet as far as possible these requirements in the manufacture of coke. These requirements in coke fuel are clearly defined under five distinct elements in its manufacture: Hardness of body; full developed cell structure; Purity; Uniform quality of coke; and coherence in handling."

Hardness of Body. The best coke possesses a hardness of body of two or three per cent. By this is meant hardness of body of cell walls, not density, for dense cokes are usually soft or plunky; while hard bodied cokes are usually well developed of cellular structure. These two physical properties, hardness of body and full cell spaces, are correlated, just as softness of body and density are associated."

"The coal from which soft coke is made lacks the element that fuses and hardens and is therefore deficient in these prime essential qualities."

"In any type of oven maximum heat is required to produce the hardest bodied coke, but it is not conductive to the largest output of by-products."

"Coals best adapted for coke making will usually afford, in conjunction, ample cellular development and hardness of body. The value in full cell structure in coke will be readily appreciated when it is considered that such fuel presents the largest surface for oxidation in a blast furnace."

FULTON'S TABLE EXHIBITING THE PHYSICAL AND CHEMICAL PROPERTIES OF COKE

REVISED SERIES

LOCALITY	Grams in 1 Cubic Inch		Pounds in 1 Cubic Foot		Percentage by Volume		Compressive Strength Lb. Per Cubic Inch 1/4 Ultimate Strength	Height of Furnace Charge, Feet, Supported Without Crushing	Order In Cellular Space	Hardness Per Cent	Specific Gravity	Chemical Analysis Per Cent						REMARKS
	Dry	Wet	Dry	Wet	Coke	Cells						Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Phosphorus	
(a) Connellsville—Standard Coke...	12.51	21.62	47.69	82.20	43.93	56.07	290	115	1	3.0	1.80	.79	1.310	86.380	11.540	.695	.0050	Average standard beehive oven, av. of 3 tests
(b) Hussner, German tests.....	14.99	23.73	57.13	89.45	48.24	51.76	387	155	1	3.1	1.89	.030	.510	86.380	13.080	.680	.0150	Connellsville coal, av. of 4 tests
(c) Semet-Solvay, Syracuse, N. Y...	15.43	24.18	58.12	91.92	49.49	50.51	370	147	1	3.0	1.90	1.250	1.610	86.660	10.480	.770	.0180	Connellsville coal, av. of 3 tests
(d) Otto-Hoffman, German Tests ..	17.57	22.63	66.93	86.18	69.17	30.83	702	281	1¼	3.3	1.90	.120	.120	85.600	12.260	.520	.0060	Connellsville coal, av. of 2 tests
(e) Morris Run, Tioga Co., Pa.....	13.02	22.41	49.03	85.37	41.82	58.18	246	97	1	2.3	1.90	.360	1.290	89.360	8.990	.760	.0110	Beehive oven
(f) Semet-Solvay, Syracuse. N. Y...	15.02	23.41	57.20	89.20	47.68	52.32	340	136	1	3.5	1.91	.230	.920	86.040	12.810	.560	.0050	Morris Run coal, Semet-Solvay
(g) Reynoldsville, Pa.....	12.44	22.17	47.39	84.48	40.63	59.37	181	73	1	3.0	1.87		1.120	87.110	11.770	1.800	.0110	Beehive oven
(h) Gallitzen, Pa.....	11.91	21.99	45.37	83.79	38.49	61.51	213	85	1	2.5	1.89		1.200	89.250	9.550	1.460	.0160	Beehive oven, B coal
(i) Monongah, W. Va.....	12.63	22.05	48.11	84.02	42.33	57.67	306	122	1	3.2	1.82	.230	.800	89.770	9.800	.970	.0290	Beehive oven, Pittsburg coal
(k) Phenville, Ky.....	14.10	22.24	53.73	84.73	50.37	49.63	227	91	1¼	2.6	1.71	1.140	.410	94.660	3.780	.590	.0070	Beehive oven
(l) Pocahontas, Va.	15.67	23.53	59.68	89.64	52.07	47.93	236	94	1	2.5	1.83	.345	.341	92.694	5.882	.738	.0063	Beehive oven
(m) Anthracite coal, natural coke...					00.00					2.8	1.75	2.270	8.830	78.831	9.393	.676		Lykens Valley

HALBERSTADT'S MAP OF SOUTHWESTERN PENNSYLVANIA COAL FIELDS, SHOWING PROJECTED LINES OF RAILROAD IN GREENE AND WASHINGTON COUNTIES

RAILROADS

There have been many proposed routes from the coking coal fields of Fayette to Wheeling, and many proposed routes along the various gravity lines of Greene and Washington County to the outside markets. They are in the main enumerated as follows:

1st. From Wheeling to Millsboro, via Majorsville up Enslow's Fork, just north of the Greene County Line, via Sparta, Lindley's Mills, Hackney, Ten Mile Village, Zollarsville, Clarksville to Millsboro, down the Monongahela River, a distance of 9 miles, to Brownsville, then up the way of the Redstone Branch to Uniontown, a distance of 16.57 miles, plus 11.76 miles by the way of Fayette County branch to Connellsville, making a total distance of 92.93 miles.

2nd. Wheeling by way of the P. C. & W. down South Ten Mile Creek, via Waynesburg, Jefferson, Clarksville to Millsboro, the line would be 3.4 miles longer than No. 1.

3rd. Wheeling to Waynesburg, via Morrisville, through Love's Mill, down Muddy Creek to Khedive, cut through to Little Whitely, a distance from Wheeling to the Monongahela River at that point, at McCann's Ferry, of only 58 miles, plus 11 miles to Uniontown, plus 11.76 miles to Connellsville, making a distance of only 80.76 miles, or 12.17 miles less than either of the other routes.

The Little Whitely route to Wheeling is ideal with the exception of at two points, one in the summit between Muddy and Ten Mile Creeks, known as Love's Hill Summit, which shows a grade of about one per cent. for a distance of three miles, opposing light; the other is at the summit between Craysville and Enslow's Fork, which shows a grade on the west side of 1.33 opposing light. These elevations should be reduced by a heavier location than this survey showed.

The railroad situation in Greene County is varied. Besides the above named routes, which could be built by the several different interests, and one of the most feasible lines that could be built through Greene County is the North and South line, such as the road travelled by the W. & W. (narrow gauge) railroad; the route north from Waynesburg, via Nineveh, Prosperity and Washington to Wabash line; then the northeastern lines, Waynesburg, via Jefferson, Clarksville to Millsboro, bridge the river and connect with the Monongahela River Railroad, gives both the P. & L. E. and the Pennsylvania the traffic.

Another line, now under construction, running north from Zollarsville to Ellsworth Branch of the Monongahela Division of the P. R. R., leaving Ellsworth via east branch of Daniels Creek, while the Pan Handle branch of the P. R. R. lines west leaves at Van Emmons Station and crosses B. & O. near Eighty-Four and comes down other branch of Daniels Creek connection at a point above Zollarsville. Also what is called the Eighty-Four Survey, which runs from Station by the same name on B. & O. about 7 miles east of Washington, Penna., through Lone Pine, Zollarsville, Ruff's Creek, down Purnam Run to Waynesburg, and thence to Blacksville via Smith's Creek. This could be built in connection with the projected cut off line from Confluence to Cameron. The B. & O. has connected with Fairview a short distance from Blacksville, then from Fairmont it owns the line to Clarksburg, has control of the C. C. & S., which terminates in Sutton County, W. Va. This would give connection with B. & O. at Charleston, and would give the B. & O. a direct line from that district to Pittsburgh. This could be secured by the construction of about 90 miles of road from Eighty-Four to Blacksville, and the line would go through an excellent coal and timber territory, besides much other traffic such as stone, farm products, etc. A projection of the line south of Waynesburg up Smith's Creek, via Blacksville to B. & O. railroad, the B. & O. could enter by crossing the river at or near Point Marion, going up Dunkard Creek and tapping the territory by extending branches up the various gravity lines entering this stream. With the exception of the

southwestern part of Greene County the entire county could be tapped or made a network of railroads because of the easy grades furnished, because of its water courses and by heavy grading, as proposed by B. & O. cut off through this district, even this territory could be developed.

In case an independent interest, other than the Pennsylvania, project and build a line into Greene County the Pennsylvania railroad will undoubtedly re-survey and build along the narrow gauge route; a widening of the narrow gauge will necessarily mean a straightening out and change of location.

The Little Whitely route will undoubtedly tap better coal and more of it than any other line proposed.

In a direct line this field of coal is only about forty miles from Pittsburgh; the State Line being less than fifty miles south of Pittsburgh. So when you consider the close proximity of Greene County and Washington County coal to the thousands of mills of Western Pennsylvania and Ohio; and when one observes the rapid production of coal, and the fast disappearance of coking coal lands from the market, it is to be wisely concluded that Greene and Washington County fields are the most available.

Note the transportation developments in Fayette County in the Coke field: The Baltimore & Ohio, the Pittsburgh & Lake Erie, Pittsburgh, Virginia & Charleston, the Monongahela River Railroad, and the Monongahela River, five in all. An East and West line from Uniontown to Wheeling, through the heart of Fayette and Greene Counties, would give, because of the natural location of good coal, a healthy feeder to any railroad making the connection at the western end.

The ultimate outcome will be that all opposition arising from the coke manufacturing companies and from the railroad interests that have been arrayed against any new railroads through Greene County in near future, will be unavailing. This opposition cannot last long as Fayette County product will, in comparatively near future, be so diminished that its output of the manufactured articles will be sufficient to supply the legitimate demands of the market. They cannot wait until that time before developing the Greene County field. They would be adverse to the competition now, or when the possible makers of coke, in the much cheaper fields of Greene County, start to operate. A new railroad would mean exactly this condition. They do not want their market disturbed, which is now in such a delightful state of dividend production that they would do everything possible to prevent it, and still some far seeing railroad or financial interest will recognize the ultimate future and prepare at early date to seize the opportunity while the chance is to be had.

INVADING NEUTRAL TERRITORY

There has been a neutral zone south of Pittsburgh in eastern Greene and eastern Washington Counties, but this zone has lately been tapped by the Pennsylvania building from a point on the Chartiers branch of the Pan Handle, and from the Ellsworth into Zollarsville, Clarksville, and connecting with the Monongahela Division up the west bank of the Monongahela River. The time is near at hand when there will be a new era in railroading in this heretofore independent territory. The Pennsylvania, the Wabash and the Vanderbilt interests, together with the B. & O., are all likely to enter; at least it is a feasable proposition for each of the above named roads to enter this territory and get their shares of the great future product of this region. Several instances may be cited where lateness in action on account of railroad interests have caused them to be excluded in a great way from their share of trade.

The negotiations of the Vanderbilt interests for the Greene County Railroad line, also the interest shown by the Goulds in trying to get a foothold in Greene County, together with the definite results accomplished by the Pennsylvania building in the northeastern corner of the County, all show conclusively what value is placed upon Greene County coal fields.

TRANSPORTATION FACILITIES

With the various railroads built and projected, we have the Monongahela River, with its free navigation, flowing into the Ohio, the Ohio into the Mississippi, and on to the Gulf. There is an ever increasing market in the territory through which these rivers flow.

The American people should favor a more systematic and comprehensive policy toward river and harbor improvements, also toward American shipping. If the great value of our waterways was kept before the people and Congress urged to undertake and complete such projects as are worthy, make appropriations regularly and not irregularly and unsystematically as in the past, then the true benefit of our waterways can be observed. This can easily be accomplished by building locks and dams and making a nine-foot stage in the Ohio at all seasons of the year from Pittsburgh to Cairo. The whole country would benefit by the investment. It will enable our coal and iron products to reach other markets that railroad freight rates make prohibitive. If an amount equal to what we are spending on either our army or navy were available, we could have in this country a development of 30,000 or 40,000 miles of inland waterways that would enable us to develop our natural resources.

James J. Hill, the Atlas of the railroad world, president of the Great Northern railroad, has delivered himself of some striking bits of information anent the congestion of the transportation lines. Mr. Hill says:

"Within ten years the railroad trackage of the country has only increased 21 per cent., locomotives 35%, and cars 45%, while the business to be done has increased 110 per cent. The inadequacy of terminal facilities in great commodities is also one of the causes of trouble."

President Hill further says that if only 25 per cent. additional trackage, with necessary terminals and equipment, making 33 per cent., is to be built during the next five years, or say in round numbers 75,000 miles of track, the cost would be $5,500,000,000, or $1,100,000,000 a year. It is doubtful even if this would make the situation at the end of five years any different from what it is now, for the tonnage of the country is increasing at present at a more rapid rate than during the past decade.

Magnate Hill outlines two remedies for the congestion of traffic: 1. Traffic must be centralized. It must be diverted from our large cities. Through traffic must have as direct routing as possible and must be kept away from congested centers. 2. Our country's waterways must be improved. Canal construction and river deepening would give aid to the transportation lines. President Hill is speaking especially for his own section and says: "A 15-foot canal or channel from St. Louis to New Orleans would go farther to relieve the entire Middlewest and Southwest than any other work that could be undertaken. With such a depth of water a single powerful boat would carry from 30 to 40 trainloads."

Coal from Pittsburgh district is carried 2,000 miles to New Orleans for about 76 cents per ton. Coal on Lake is carried 900 miles at 30 cents per ton. The distance from Erie to Duluth is 917 miles; Cleveland to Duluth is 834 miles; Buffalo to Duluth is 985 miles.

Increased railroad development means increased demand for iron and steel and likewise a wider market for coke.

CHARGE FOR LOCAL DELIVERY PITTSBURG DISTRICT. 10-MILLS

FROM PITTSBURG DISTRICT TO LAKE 5.5 MILLS

PITTSBURG №8 DISTRICT LAKE 5.5 MILLS

FAIRMONT DISTRICT TO LAKE 3.88 MILLS

HOCKING DISTRICT TO LAKE 3.86 MILLS

KANAWHA DISTRICT TO LAKE 3.13 MILLS

THACKER DISTRICT TO LAKE 2.60 MILLS

BIG SANDY 2.37 MILLS

POCAHONTAS 2.46 MILLS

NEW RIVER 2.30 MILLS

3.50 MILLS PER TON PER MILE

RAILROAD FREIGHT CHARGES
TO
THE GREAT LAKES

compared with

Other Coal Districts shipping
To the Lake Front

Comparisons are shown
in Mills per ton per mile

■ REPRESENTS
ONE Mill PER TON PER Mile

A STUDY OF THE SITUATION SHOWS

That the Pittsburgh Coal Field is located at and nearest the largest fuel consumption in the world, giving it a corresponding value.

An analysis of the present freight rates indicates that an adjustment is imperative in order that the coal rates may be reasonable and equitable.

An adjustment of equal rates per ton per mile will add great value to every acre of Pittsburgh Coal.

The Following Is
A LIST OF FREIGHT RATES
Now Obtained from the Different Coal Districts
TO NEAREST LAKE PORTS
For Lake Shipments

WHAT THE RATES NOW ARE

Showing the wide difference between Districts and unreasonable rates charged the Pittsburgh District.

WHAT THE RATES SHOULD BE

3-½ mills per ton per mile is used as a base and multiplied into average distance.

Coal District	Average Distance	Present Frt. rate f. o. b. Lake front	Rate mills per ton per Mile charged	Delivered rate per ton @ 3-½ mills per ton per mile	
Pittsburgh,	160 mi.	$0.88	5.50	$0.56	per ton.
Pgh. No. 8,	150 "	.83	5.5	52.5	" "
Fairmont,	250 "	.97	3.88	.875	" "
Hocking,	220 "	.85	3.86	.77	" "
Kanawha,	310 "	.97	3.13	1.085	" "
Thacker,	380 "	.97	2.60	1.33	" "
Big Sandy,	410 "	.97	2.37	1.43	" "
Pocahontas,	455 "	1.12	2.46	1.5925	" "
New River,	490 "	1.12	2.30	1.71	" "

Freight Rates to Chicago from Eastern Coal Fields, Showing Distances, Rate Per Ton Delivered, Rate Per Ton Per Mile

District	Distance Miles	Present Freight Rate	Rate Mills Per Ton Per Mile Charged	What the frt. Rate would be based on 3-½ mills per ton per mile multiplied into the average distance	Present Overcharge or Undercharge
Pittsburgh,	490	$1.90	3.88	$1.715	Overcharge 18 1/2c ton, or $1850 per acre.
Fairmont,	529	1.90	3.592	1.85	Overcharge 5c per ton, or $500 per acre.
Kanawha,	532	1.90	3.572	1.86	Overcharge 4c per ton.
Thacker,	572	1.90	3.222	2.00	Undercharge 10c per ton.
New River,	585	2.05	3.50	2.05	Correct charge @ 3 1/2 mills.
Pocahontas,	646	2.05	3.173	2.26	Undercharge 36c per ton.

From the foregoing Statement and Analyses of existing Freight Rates, several facts are obvious:

That local rates in the Pittsburgh District, including the Shenango and Mahoning Valleys, are based on 8 to 10 mills per ton per mile.

That R. R. Lake Freight Rates, per ton per mile, from the Pittsburgh District are now 50% greater than from the Fairmount District and are from 90% to 100% greater, based on distance hauled and service rendered, than from the Kanawha, Thacker, Big Sandy, New River and Pocahontas Districts.

That either the management of Railroads hauling the coal from the latter coal fields are losing money on the traffic and in that manner dissipating the money of their stockholders or that the Railroads entering the Pittsburgh District are taking from the owners of Pittsburgh coal lands at least 30c per ton or from $2,000 to $3,000 per acre. It is common knowledge that hauls of over 100 miles on coal traffic give dividends to Railroad stockholders when the charge is not in excess of 3½ mills per ton per mile.

The average round trip distance from the Pittsburgh District to the Lakes is 320 miles. A return ore haul is provided—the total revenue being approximately $1.75 for the round trip of 320 miles.

The round trip from the Fairmont field is 500 miles—the revenue being for a large portion of the traffic 97c for 500 miles haul on account of cars returning empty.

The round trip from the other fields is;—Hocking 440 miles, Kanawha 620 miles, Thacker 760 miles, Big Sandy 820 miles, Pocahontas 910 miles and New River 980 miles. The revenue for a good portion of this traffic, on account of empty return hauls, is 85c., 97c., 97c., 97c., $1.12, $1.12 and $1.12, respectively.

It is clear that rates must decrease on Pittsburgh coal to the Lake, the demand for which is enormous and now growing at the rate of 20% annually. The re-adjustment of freight rates is imperative and will add at least 10c. to 20c per ton, or from $1000 to $2000 per acre to the present values.

Whether the increased iron and steel products are manufactured in the Pittsburgh District or on the Lake front at any point on the Great Lakes, the fuel used will be largely Pittsburgh coal.

Coal for By-product Coke can at the present freight rates be placed at the point of manufacture at the following transportation cost:

R. R. freight rate to Lake front.....	88c.
Vessel loading charge.....	7c.
Lake freight rate (owner's boats).....	30c
Cost of modern unloading.....	10c.
Total transportation cost,	$1.35 per ton.

The transportation cost of Southern coking coals at present R. R. freight rates all rail delivery to the following points is,

	to Chicago	to Detroit
Fairmont	$1.90	$1.40
Kanawha	1.90	1.40
Thacker	1.90	1.40
Big Sandy	1.90	1.40
New River	2.05	1.60
Pocahontas	2.05	1.60

The transportation cost of laying down the Pittsburgh District coal with a freight rate (in proportion to distance and service rendered) by water delivery to any point on the Great Lakes will be as follows: R. R. freight rate based on 3½ mills per ton per mile:

Railroad freight rate to Lake point	56c	to	65c
Cost of loading vessel.....	5c	to	7c
Lake freight (owner's boats)....	30c	to	30c
Cost of modern unloading.....	10c	to	10c
	——	to	——
	$1.01	to	$1.12

The difference in favor of Pittsburgh District coal for any point on Lake Michigan or Lake Superior against other coal suitable for by-product coke on present freight rates amounts to 55c per ton, or $5,500 per acre in favor of Pittsburgh District Coal as against an all rail haul for competitive coal. With the adjustment of Railroad freight rates, which is not very far distant, the Pittsburgh District would have an advantage by Lake route of approximately 75c per ton, or $7,500 over all rail coal from the Kanawha, Thacker and Big Sandy Districts to Chicago and vicinity, and an advantage of $4,000 per acre over Kanawha, $7,500 per acre over the Big Sandy or Thacker Districts, and from 85c to $1.00 per ton, or $8,500 to $10,000 per acre over the Pocahontas or New River Districts if all the latter districts competed by the water route—each district paying the same rate per ton per mile to the Lake front.

Any advantage the latter coals might have in possessing higher percentage of fixed carbon and thereby increasing the coke yield slightly, would be small compared with this vast advantage of position possessed by the Pittsburgh Coal Field.

It is apparent that the Pittsburgh Coal Field has not yet attained its maximum value. That this value must increase rapidly, is certain, not only on account of the enormous home consumption, but also on account of the large increase in the iron industry along the Great Lakes. With readjustment of freight rates doubling the value of Pittsburg coal, as the railroads fit the freight rates to the service performed (and it is safe to assume that this latter advantage is not far distant), Pittsburgh Coal values will increase at very rapid rates.

The Coke Industry in South Western Pennsylvania, given in letter written by Fred C. Keighley, Gen'l Supt. of Oliver & Snyder Steel Co. and President of Coal Mining Institute of America. Mr. Keighley is one of the highest authorities on coal mining and coke making in the United States.

Oliver, Pa., August 12th, 1907.

Mr. John W. Boileau,
Park Building,
Pittsburg, Pa.

Dear Sir:

In answer to your letter of August 10th in which you ask for an expression of my opinion relative to the future of the Coke Industry of Southwest Pennsylvania and probable line of new development.

The future of the Coke Industry never appeared brighter than at this time. Blast Furnaces (over 50) are springing up all over the steel manufacturing sections of this Country and the Coke plants now making coke of the necessary quality find that their full output is greedily devoured by the Blast Furnaces already in operation, so that more development is imperative in the Coking Coal Fields, and this is not all, for other uses are being found almost daily not only for high grade coke but inferior grades as well. Prices for coke will certainly not only keep up but advance considerably in the near future, especially for the better grades such as the Connellsville and Klondike Cokes. This advance in prices for coke is not altogether caused by the present requirements of the Steel Industry. There are additional reasons. The areas of high grade coking coal are quite limited and such coal now available lies at considerable depth. The prices for coal lands of all descriptions, especially coking coals, are advancing rapidly. New railroads have to be built into the undeveloped sections and this with increased depths of shaft sinking makes it very doubtful indeed whether it is possible to develop coke operations fast enough to keep pace with the constantly expanding requirements of the Steel and Metallurgical industries of this Country.

A few years ago when drift and out cropping coal was available it was possible to develop a coke operation in a year's time or less and get its output to full capacity if it was a moderate sized plant. At this day things are vastly different as the time of small plants is about over. Railroads have to be extended and deeper sinkings to be made, consequently larger operations are necessary so that three or four years instead of one year are required to bring a modern coke operation up to its full capacity.

A Blast Furnace can and has been erected and put in operation in one year or less. Blast furnaces are actually being built to-day without an assured source of their coke requirements being in sight.

As to the probable line of new developments in the Coke Indnstry I feel that I can confidently state that it will certainly be to the Southwest of the present Connellsville and Klondike operations. The line of all expansion, material, industrial and otherwise is invariably in the direction of the line of least resistance, therefore the natural, rational, and logical trend of Coke manufacturing development and construction will follow where the entering wedges as it were have already been driven and that is to the South and West of the Connellsville and Klondike fields, thus naturally following the lines of success achieved in those fields.

Years ago Horace Greely said, "Go West, young man, go West." The enterprising coke manufacturer of to-day does not wait to be told to "go Southwest," for his advance guard is already there busily engaged in setting up stakes for the operations of the immediate future.

As to your further questions, viz.: Does the Connellsville seam continue to bear its coking capabilities and characteristics as it trends to and enters the Counties of Washington and Greene? There is but one answer to this. It does. It will undoubtedly make coke. What will the quality be? It will be good, bad and indifferent just as it is in the Klondike field and just as it is in the Connellsville field. Quality is entirely dependent on local conditions and treatment and these factors are not corralled or bounded by County lines, neither is it likely that Fayette and Westmoreland have a complete monopoly of the factors entering into the manufacturing of high grade coke.

Both Washington and Greene Counties possess areas of low sulphur coking coal and they also possess high sulphur coals, but there will be a market and field for all.

The man that knows his business will know where to select his coal and find the ways and the means of not only reaching the deposits of low sulphur coal, but will adapt himself to the varying conditions found in all coal fields.

As to the cry that high sulphur has been found by the diamond drill in some localities to the Southwest it is but natural that much ado should be made by the pessimists, especially when people are apt to reason upon false premises and are ignorant on certain lines.

As a matter of fact, the diamond drill when used in testing soft coal invariably gives higher sulphur indications than the seam bears for the reason that the richer and purer coal is generally the softer portion of the seams, and as the drill penetrates it much of the purest coal is carried off as float by the water used in manipulating the drill, leaving behind in the core barrel the sulphur and slate, making the percentage of these elements appear higher than they really are.

It is easy to see that the high sulphur coals will be found first in any new field for the reason that the anticlinals throw the coal nearest the surface where it is the most readily found and more easily reached than it could possibly be

reached in the Synclines. The anticlinals generally carry the most sulphur and the synclinals the least and as there are two anticlinal flanks to every synclinal there would naturally be twice as many chances for the high sulphur areas being first found. Again, much stress is laid upon the proved Geological fact that the sulphur constituents of coal increase from East to West, but this is misleading to the uninitiated.

The coal basins of Southwest Pennsylvania run in a Southwesterly direction and the sulphur lines undoubtedly follow the same general course, therefore the coal fields of Greene County while further West geographically are not so far West when Geologically considered, consequently are not beyond the low sulphur zone. The writer feels confident that at least one low sulphur belt traverses the whole County of Greene from Northeast to Southwest. As to the width of this belt (it may be miles) nothing but actual working will determine it. It will not follow straight lines, but the general course will parallel the line of the center of disturbing influences.

I am greaty pleased to have the opportunity to scan your volume on "The Coals of Southwest Pennsylvania" and congratulate you on the vast amount of information you have so ably gotten together. You certainly merit success and deserve the appreciation I have no doubt the readers of your volume will express. Like the Grand Old Alleghenies you are pointing to the great Southwest and you know and I know that the line of progression must follow the ways chosen by nature. The railroads have scaled the mountains and often neglected the valleys, but after long years of persistent refusal to follow the lines of least resistance they are beginning to realize that scaling stone walls is an unprofitable pastime even for Railroad Magnates to indulge in.

Very truly yours,

FRED C. KEIGHLEY,

THE CONNELLSVILLE COKE SUPPLY

Written by L. W. Fogg

In Iron Age

"The tremendous development of the iron and steel industries of the United States has been the cause of similar development in the coal and coke business of the country. In reading the very interesting article of Edward W. Parker in The Iron Age of February 7, one is at first amazed at the enormous resources that the United States contains in coal areas and the great wealth that lies undeveloped in the earth. What the relative values of these undeveloped coal deposits are, in comparison with those already developed, especially for the manufacture of coke, is the question which is now interesting coke manufacturers. The great drain on the coal fields of Fayette and Westmoreland counties in Pennsylvania (which, as Mr. Parker says, form a class of their own), that have been producing approximately 50 per cent. of the coke manufactured in the United States, is being felt to such an extent that the remaining life in the old field is a pressing consideration. This article deals only with the coal areas and coke production in these two counties.

THE PITTSBURGH COAL SEAM AND ITS LOCAL NAMES

Connellsville, Lower Connellsville and Upper Connellsville are local names applied to the Pittsburgh seam of coal.

The Pittsburgh seam is one of the most persistent geological formations known. Confined within the limits of the outcrop lines it is sure to be in its place as the soil which covers the earth. Lying in regular folds of slight grades, regular in thickness and purity, it presents the most economical conditions for the miner, conditions which are not met in any other seam. When the coal was formed it lay in one continuous coal blanket, but after the lifting of the earth's surface an erosion took place leaving a barren measure in the Pittsburgh seam, extending from 400 to 500 ft. to 2½ miles in width. Lying to the east and north of this barren measure is the Connellsville coal, extending from the West Virginia-Pennsylvania State line northward through Greene, Fayette and Westmoreland Counties. The Upper Connellsville coal is that part of this seam which lies north of the Loyalhanna River and the Pennsylvania Railroad. The Lower Connellsville consists of that part of the Pittsburg seam lying in the southwestern part of Fayette County, south of Redstone Creek and west of the Connellsville outcrop.

These three subdivisions have their characteristics in their product. The Connellsville is softer coal and produces slightly larger coke than either of the other two, while the Lower Connellsville averages less in phosphorus and slightly more in ash than the Connellsville.

THE GREAT IMPORTANCE OF CONNELLSVILLE COKE

Connellsville coke, the product from these two counties, is standard. It has been one of the factors which has made Pittsburgh what it is. It has produced for the furnace man the best results in the manufacture of pig iron, and he is loth to accept a different product. Its worth is further shown in the increase in the value of coal lands during the past ten years of from $300 per acre to $3,000 per acre. An average price during the last year has been approximately $1,700 per acre. It has made the land owner independent, fortunes have been made by investors, and the operator who understands his business and has built on scientific principles has never failed to pay a good and sufficient dividend. It is a significant fact that there

has not been an insolvency nor forced liquidation in the coke business of Fayette County in the past 34 years, or since the panic of 1873.

These reasons, together with its proximity to Pittsburgh, Shenango and Mahoning districts and its excellent railroad facilities, are the most important causes, for the demand for Connellsville coke.

Ten years ago the predictions were made by well informed operators in the Connellsville region that the coal from the Lower Connellsville fields would never produce a quality of coke acceptable to the trade; that the Pittsburgh seam outside of the Connellsville District proper was only a steam coal proposition, and as a coking proposition it would never take the place of standard Connellsville. How far this judgment has erred is evident from the following figures:

GROWTH OF THE LOWER CONNELLSVILLE OUTPUT

Connellsville coke in 1901 constituted 47 per cent. of the entire coke manufactured in the United States. In 1905 it was 35 per cent. Lower Connellsville produced 5 per cent. of the entire output in 1901, and in 1905 it made 12 per cent. Lower Connellsville increased its output 246 per cent. between the years 1901 and 1905. To-day 95 per cent. of the Lower Connellsville coal lands is in the hands of operators, and the price of such lands has advanced in the last five years from $300 to $2,000 per acre. The total original acreage of coal in the Lower Connellsville field is approximately 61,658 acres, and that of the Connellsville field proper 88,576 acres. How much coal is left and how long it is going to last are the interesting questions. Mr. Parker states that the increase in output is 50 per cent. in five years. It is probably a fact that the increase between 1902 and 1907 has been greater than that given.

It is evident that Connellsville coke is each year losing its percentage relative to the total amount produced in the country, as in 1901 it was 47 per cent. and in 1905 it was 35 per cent. The output of Connellsville coke cannot be increased as fast as the demand, for there are no further tracts that can be developed. It is probable that in five years it will have reached its maximum output, and thereafter the supply will steadily and rapidly decline and coking plants go out of commission, and in 30 years the Connellsville field will be practically exhausted. The Lower Connellsville field, which only began to make coke seven years ago, will reach its maximum development about 1916, and thereafter the supply will rapidly decline, and plants with 20 and 30 years' life will from time to time drop out, so that in 40 years it will complete the exhaustion and Fayette County will have finished its coking industries from the Pittsburgh seam.

THE GREENE COUNTY FIELD AVAILABLE

It would be a serious matter to Pennsylvania and Ohio furnace interests if they should be obliged to look elsewhere than this immediate district for their supply of coke, but we know that lying west of Fayette County, in Greene County, there is waiting at least 160,000 acres of coking coal. Some time before the Lower Connellsville coke has reached its maximum output Greene County coke will be in the market, and the history of this development will be as the Lower Connellsville has been. Its development will go forward rapidly for, with the exhaustion of the older fields, this new field must make up the deficiency.

In reviewing the coking industry one comes to the conclusion that probably the best and cheapest coal was mined first, but there was also more waste in mining and carelessness in manufacturing coke. By improving the operation and manufacturing of coke we have produced and will continue to produce equally as good results from coal in the Pittsburgh seam lying west of the Connellsville basin."

Mr. Fogg is General Manager and Constructing Engineer of the Tower-Hill Connellsville Coke Co., Uniontown, Penna., and is well known. He has been identified with the larger interests and important work in the coking coal fields for many years, and is an expert coal authority on coking matters. He has constructed a large number of the important coking plants in the coking regions.

EASTERN GREENE AND EASTERN WASHINGTON COAL PURCHASES AND DEVELOPMENTS

During the first six months of the year 1907 there has been a notable trend toward Greene County Coking Field, as shown by the following:

The Bessemer Coke Company has a plant ready to put in blast as soon as railroad connections are made from a point near Zollarsville to the Monongahela Division of the Pennsylvania R. R.

The Dilworth Coal Company is establishing a coke plant on its holdings near the month of Ten Mile Creek in Greene County. It proposes to erect two hundred ovens.

The Pittsburgh-Buffalo Company, which owns 16,000 acres, intends erecting one of the largest coking plants in the United States near Zollarsville.

On Muddy Creek, the Andrew-Hitchcock Iron & Steel Company, the Youngstown Sheet & Tube Company, and the Gillmore Coke Company all intend opening up operations.

The Osborne and Patterson interests will undoubtedly develop their property when the broad gauge line touches their coal.

The Pittsburgh-Westmoreland Coal Company has recently purchased more than twelve thousand acres in the Southern part of Washington County near Ten Mile Village. It will reach markets on the line built from Van Emmons Station on Chartiers Valley Road, down Big Daniels Creek, to a point near Zollarsville; also via Amity.

Coal and coke tests in these tracts show excellent results.

At the Ellsworth operations there are six hundred coke ovens, and many more are under construction. At the present time they are producing sixteen to twenty thousand tons of high grade coke per month. Their coal production is about seven thousand tons daily from the three operations.

F. H. Osborne, President — J. G. Patterson, Vice Pres't — S. H. Robbins, Sec'y & Treas.

The Youghiogheny and Ohio Coal Co.

Miners & Shippers of
Youghiogheny Gas, Pittsburgh Steam
and Pittsburgh No. 8 Coal.

General Offices,
Western Reserve Building
Cleveland O.

BRANCH OFFICES
PITTSBURGH, PA.
910 FRICK HOUSE BUILDING
BUFFALO, N.Y.
928 PRUDENTIAL BUILDING
CHICAGO, ILL.
FISHER BUILDING
MILWAUKEE, WIS.
WELLS BUILDING

ALL QUOTATIONS, ORDERS, CONTRACTS AND SALES ARE SUBJECT TO OUR SUPPLY, STRIKES, ACCIDENTS AND CAUSES BEYOND OUR CONTROL.

August 8th, 1907.

In reply please refer to our file No.

Mr. John W. Boileau,

Pittsburgh, Pa.

My dear Mr. Boileau,-

In reply to your letter of July 28th, in reference to our Greene County coal holdings, wish to advise that we have drilled several holes on same and find the analysis of the entire tract very satisfactory; and by comparison with other coking coals, we consider it a first-class coking proposition in every respect.

We are great believers in the future and merit of Greene County coal, as we were among the very first that took up any coal in this locality.

We have not changed our minds one particle, and in fact we think better of it today, as our investigation has proven favorable beyond our expectations.

We expect to open up in the near future some coking propositions on our acreage.

Very truly yours,

F. H. Osborne

PITTSBURG-BUFFALO COMPANY.

General Offices Frick Building

JOHN H. JONES,
PRESIDENT.

PITTSBURG, PA. July 27, 1907.

Mr. John W. Boileau,

Pittsburg, Pa.

Dear Sir:

In reply to your letter of July 26th, beg to say in reference to the 16,000 acres of coal owned by our Company in Washington and Greene Counties that we have drilled between 30 and 40 holes over the entire tract and had analyses of same made, which analyses show this coal to be a first-class coking coal in every respect.

We will have our first shaft completed within the next two or three weeks, and if you care to make any additional analysis of this coal at that time, you are at liberty to do so. We propose to put in the largest coking plant in the world on this property as soon as we have made a thorough test and demonstrated the physical structure of the coke.

Very respectfully yours,

JHJ R

PITTSBURGH - WESTMORELAND COAL CO.

FULTON BUILDING,

PITTSBURGH, PA.

August 10th 1907.

John W. Boileau, Esq.,

Park Building, Pittsburgh, Penna.

Dear Sir:-

Our Company has been carefully testing the Pittsburgh seam of coal in Washington County lying between the Pin Hook and Waynesburg anticlinals for the last four years. I refer particularly to the coal land owned by our Company, which lies to the west of the Jones & Laughlin coal lands and to our lands which are contiguous to the Lackawanna Steel Company coking coal lands on both the north side and the south side.

This coal we have coked repeatedly, and have found that without exception it has produced a coke under one per cent. in sulphur, with cell structure and burden bearing qualities equal to the standard coke of the Connellsville Distriot.

In addition to the information, which we have secured through our own efforts, we learn that the steel companies, which are making coke out of the adjoining lands, have secured similar results by operating on a large scale.

Very truly yours,

HAK:ERS

H. A. Hunky

Frank Hitchcock President W. J. Hitchcock Vice President H. H. Handy Secretary & Treasurer

ALL SALES SUBJECT TO STRIKES OR ACCIDENTS

The Andrews & Hitchcock Iron Co.

Manufacturers of

Hubbard Scotch Foundry and Bessemer Pig Iron.

Youngstown, O. August 3rd., 1897.

Mr. John W. Boileau.

Pittsburgh, Pa.

Dear Sir:-

Mr. J. V. Thompson of Uniontown, Pa., asked me to write you what I thought of the coal lands we bought in Greene County.

The Youngstown Sheet & Tube Company and ourselves drilled and tested what would equal about 50,000 acres of coal land in Greene County during a year ago last summer and a year ago last winter. From what we could learn about it, we believe the coal in Greene County just as good as the coal in the Klondike. After going over it thoroughly we picked our territory on the south branch of Little Muddy Creek.

The coal seems to be very regular where we did our drilling, and the analysis of the coal will average just about the same as the Klondike coal.

Yours truly,

THE ANDREWS & HITCHCOCK IRON COMPANY,

Frank Hitchcock Pres.

COKING COAL—WASHINGTON AND GREENE COUNTIES

For several years it was the general opinion that the coal in the Klondike field would not make good coke. The present operations and results to-day show how absurd that belief was. With but few exceptions Fayette County coal fields are in the hands of large iron and steel interests, and little remains in the hands of the farmers as previously owned.

The next field that is advantageously located and that is known to be available for coke making is eastern Greene and southeastern Washington Counties. It can be easily proven that this is the greatest and most valuable undeveloped coking field in America. It is partially developed in the northern portion, and examinations and drillings throughout have been made and proves its great worth and merit.

The following interests have purchased and are operating and developing this territory: Jones & Laughlin Steel Company; Pittsburg & Buffalo Company; The Bessemer Coke Company; the Clyde Coal Company; the Lackawanna Steel Company, and others; besides these, the Osborne and Patterson interests; Mr. J. V. Thompson; Pittsburgh-Westmoreland; Andrews & Hitchcock Iron Company; H. C. Frick Coke Company, and others have made examinations and developments and have satisfied themselves with the quality of coal they have secured.

To show how largely some of these interests have purchased, the following is given: In the eastern part of Washington County the United States Steel Corporation have several thousand acres of coal; this is mainly in the gas and steam coal belt. In the southeastern quarter of the county the Lackawanna Steel Company has holdings of almost 20,000 acres. This is the property transferred early this year by the J. W. Ellsworth interests. East of these holdings is the large acreage of the Monongahela River Consolidated Coal & Coke Company. Directly south are the holdings of Jones & Laughlin, aggregating many thousand acres. To the west and adjoining the last named interests, the Pittsburgh & Buffalo Company has 16,000 acres or more, a small portion of which extends into northeastern Greene County.

The entire northeastern quarter of Greene County is owned mainly by J. V. Thompson and associates. F. M. Osborne interests and the Bessemer Coke Company have holdings along North Ten Mile Creek. The eastern central and southeastern Greene County from Waynesburg east is owned and controlled mainly by Uniontown interests, at the head of which is Mr. J. V. Thompson of Uniontown with his successful experience in coking coal. With the presence of the Steel interests enumerated above, and prominent coal operators such as John H. Jones, Frank M. Osborne, John G. Patterson and others; with the advent of the many prominent interests named above in the field, with an acreage aggregating many thousands, properly located coal in eastern Greene County, should serve others desiring similar product just as well.

The reason for this being the greatest undeveloped coking coal field in America is because of its geological, economical and commercial merits. Geologically we have a persistent bed of the Pittsburgh or River seam. As to the other end of it, it is nearer to Pittsburgh, the centre of the manufacture of iron and steel. Pittsburgh is secure from this standpoint, and is always destined to keep a most conspicuous place in the manufacture of the above named products. The district has great natural advantages which cannot be overcome. With both rail and water, and while we are handicapped by the lack of sufficient transportation facilities, in the advent of the railroads having good car service our tonnage would be much greater. Our trade is steadily expanding and the railroads must afford Pittsburgh better transportation accommodations than this, in making improvements, by which we again doubly profit.

There is something very luring in a gold mine however uncertain its outcome may be, but when we note the statistics prepared by the Geological Survey showing the value, by States, of the mineral products of the country, we find that Pennsylvania produces six to ten times

the value what either Colorado, California or Montana yields. All of which makes us feel that we should not lose sight of our coal fields in this State. It would seem much better to buy gas, steam and fuel coal, and especially coking coal at prevailing prices, than to purchase interests in the many mining camps of the West, with their uncertain outcome.

Remaining coal acreage of good quality and location will continue increasing in value and prices of to-day will look cheap 10 years from now.

INCREASE IN VALUE OF COAL LANDS

The Connellsville coal field may be said to have come into prominence during the late Seventies. The demand for the coke of the district was active in the Centennial year, 1876, increased to 1878-79 when the prices of coke reached $5 to $6 per ton.

During the year 1879-80 large tracts of coal lands were purchased and the development of mines, and the erection of coke ovens was begun on a scale which surpassed all former attempts toward coke production.

The advance in the prices of coal lands was not exceptionally rapid, owing perhaps to the prevailing belief that valuable coking coals were not found south of Uniontown, Penna., or Mt. Pleasant, Penna., as the northern boundary of the limited field.

In 1885 large areas of Connellsville district coal lands were available for purchase at prices ranging from $50 to $100 per acre. 1890 to 1895 prices mounted up to $600 and $700 per acre. A belief was current that these prices were too high and would be lowered, but these coal lands at present command $2,000 to $2,500 per acre, and will continue to advance beyond these figures, enormous though they appear.

A very small proportion of the lands were bought and sold speculatively. Usually the farmer who owned and tilled the lands containing coal became the beneficiary of the advance in price, and with it passed from comfort to wealth.

Other coal districts have been benefited in prices in like manner. In 1897 the average price of coal lands in eastern Washington and eastern Greene Counties, Penna., was less than $30 per acre—coal along the Monongahela river $100.00.

In the Fairmont, West Virginia, mining district Pittsburgh seam coal during the same period of time has advanced from $50 and $75 to $300 and $400 per acre for coal.

Many other instances can be recited, but all may be summed up in the brief statement, "that coal lands offer the best and safest investments, being protected from the ravages of fire and flood, and constantly increasing in value at rates beyond the earning powers of most corporate bodies, and without any of their speculative risks."

Hon. E. H. Gary, in an interview, stated:

"We have 60,000 acres of coking coal lands in Pennsylvania and are paying $2,000 an acre for all that is offered us. A reasonable valuation of our coal land, therefore, is $120,000,000. The coke ovens and equipment are worth $100,000,000 more."

INCREASED VALUE OF COAL LANDS

Well located tracts of coal will not depreciate in value. Coal is by far the main factor in the industries of this country. Demand grows; production increases; fields are becoming depleted rapidly and cannot be replaced. It is a well known fact that in the coal areas already mined over in the Connellsville region, a great amount of coal was lost.

Coal is consumed; its energy is gone; not like iron and many other minerals converted into permanent form and freqnently used again. The coal resources are being depleted forever.

There are many who are skeptical as to the wisdom of investing money in real estate, and especially after a large increase in value is noted. United States and Canada are rich in

examples of great advances in land values. There have been many great bargains in real estate. Every one knows that the whole of Manhattan Island was sold by the Indians for twenty-four dollars. Look at the great value of real estate there now.

Pennsylvania is the second most populous state in America and has an area of about 45,000 square miles. William Penn took this territory in settlement of a comparatively trifling debt which Charles the Second owed to Penn's father and which he found himself disinclined or unable to pay in cash.

Less than ten years ago, when Fayette County coal lands were selling at an absurdly low price, many observed the rapid depletion of the fields and their probable rapid future increase in value, and large areas were purchased. At the same time values were observed in Greene County. They were far below what their location and future worth should be. With these examples before us, still many hesitate and think values are too high. There has been a gradual rise in land value in almost every state in the Union where there is any mineral wealth or development that is necessary for our industrial progress. The increase has not been nominal, but has been rapid and in accordance with our industrial progress. In ten years these Greene County lands will have increased in value to such extent that the price to-day will look absurdly small. When the county begins to be studded with coking coal operations and other manufacturing enterprises, it is then that the short-sighted will think the prediction as to Greene County's future at this time was a correct one.

PITTSBURGH COAL BED

The inherent value of the Pittsburgh coal bed can hardly be overestimated. An investigation for either active mining purposes with present market conditions, or simply to hold for appreciation value, would be regarded safe and profitable by the most conservative. Natural gas displaces thousands of bushels of coal annually in Pittsburgh.

The gas reserves will become depleted in the very near future and this means, in its stead, a larger market for coal. The Pittsburgh bed, with its normal thickness of 6 ft. to 8 ft. is certainly a valuable asset.

Quoting from paper on coking coal prepared by F. C. Keighley:

"Greene County is underlaid with hundreds of square miles of the great Pittsburgh coal seam, and nothing but the lack of railroad facilities has kept it from development. In less than ten years I predict that it will outrival the justly famous Klondike district of Fayette County, Pa. The time has arrived when the necessities of the times and business will force the development of this great Greene County coal field, the county that possesses more area of thick seam Pittsburgh coal of high quality than any other county in the Union. The Pennsylvania Railroad has already entered the field and has some ten miles of road under construction along the west bank of the Monongahela River, and there will now be as great a scramble among the railroads to get into Greene County as there has been heretofore to keep one another out and make the people believe that the Monongahela River was the limit to development for a generation to come."

All eyes are naturally turned to the coal across the river from Fayette County. Tests have been made on the Greene County side that demonstrate the utility of this coal for coking. It certainly can be classed a similar coal to that of Fayette and Westmoreland.

Several of the large interests have made quiet analyses of the coal on this side of the river and some of them are quite favorable, while others show that crushing or washing or other preliminary process will have to be gone through before it can be coked. Some of the analyses made show that the probable reason for high sulphur next the river is because of erosion and penetration of impurities through the covering of the coal. Several old flood plains are to be noticed and under these coal of high sulphur will be found.

The Greene County coal is naturally a coking coal. In many instances, it is chemically the same, and physically it is slightly more firm than that on the east side of the Monongahela

River. This is natural partly because of its covering, but as to the purity of the coal, it has been fully demonstrated. It does not look reasonable that a river should divide the coking and non-coking coals.

It is proven that as you go westward from the Monongahela River, the greater the coal increases in sulphur and ash, but the territory east of Waynesburg in the main is coking coal. The purity of the coke depends partly upon how clean the coal has been mined by the miner and the methods used in coking it.

Since the coal is chemically as pure, or nearly so, by crushing the coal you put it in nearly the same physical condition as that of the Connellsville, hence a quality of coke that is even more firm that that of the old Connellsville region, and still of sufficient purity to answer the purpose desired in the furnace.

THICKNESS OF SEAM

The Pittsburgh seam of coal, which is extensively mined from Pittsburgh to Lock No. 6, and also in Fayette County, shows a thickness along the river from six to nine feet and is very regular in bed, showing no abrupt changes in thickness. The coal in the territory between Brownsville and the State line does not show the high percentage of sulphur that the Pittsburgh Seam of coal shows as you go south from Fairmont. It seems as if there is an increase in sulphur and ash and other impurities as you go both south and west. Take the mines of the Fairmont district and their output in steam, gas and coking coal. At Monongah in the mines near Fairmont, there is a good output of coke, largely crushed coke for foundry, engine and domestic use. It usually shows a low percentage of phosphorus, and has quite a demand from the furnace people.

The coal along the front of the Seventh Pool on the Greene County side of the river shows a thickness of eight feet. The seam of coal in the district in question has a thickness of from six to eight feet, and the quality as shown by the various analyses answers the requirements of the furnace people as well as others. An average analyses of the coal at a point from the Ellsworth through the eastern-central part of Washington and Greene Counties to the West Virginia line shows that this field is available for coke. The physical properties of the coal are such as to enable handling in transportation.

FUTURE VALUE OF COAL LANDS

The probable increased future value of Greene County coal, especially on coal that is located to an advantage, in my mind can be wisely and fairly judged by the prevailing prices of Fayette County coal to-day. Nothing there can be had under $1,500 per acre, and but little first quality can be had for less than $2,500 per acre. In fact the holdings are in the hands of large steel interests and operators who are not willing to part with same.

There are some large holdings that will have a fair acreage at the end of 20 years' operation, but these are few in number. At the end of that time at the rate of the present consumption and the probable future increased production, such as has been evident and prevailed for the last 30 years, will find a very small acreage. Within the next five or ten years the Connellsville coking field will have reached its high mark in production, and thereafter there can be no other result than a rapidly diminishing production.

The demand to supply the requirements daily becomes more insistent. The only field to retrench this inevitable loss is eastern Greene and southeastern Washington Counties. It is true that there are coals of merit in other States, but they are in locations that because of the distance from market or point of consumption, they are not economically and commercially as valuable as would be the above mentioned districts, even with a prevailing high price for the acreage. The soft coal in the Pocahontas district is very pure in analy-

sis, especially low in ash and sulphur, but it is a question as to how much of it can be made into coke that will withstand the strain in the modern blast furnace. There is quite an area of this coal, but it is farther away from the mills of Western Pennsylvania and Eastern Ohio. The difference in distance, regardless of the merit in quality will make the coals of eastern Greene and Washington Counties preferable.

DEPLETED AREAS OF COAL

The vast wealth in the coal districts is being rapidly depleted and good virgin coal territory is and will continue to be scarce. Much coal property has been purchased by investing and financial interests, and by large industrial corporations for future use.

To observe how rapidly the reserve force of nature is being depleted, one need only take notice of the abandoned works of old operations as may be seen in any well developed territory, such as throughout the Hocking Valley in Ohio, up the Monongahela River between Pittsburgh and the State line, and the Connellsville coking fields in Fayette and Westmoreland Counties.

Large coal interests should fortify themselves for a long term of years. Observing the results and experiences in the anthracite region, this warning should be heeded.

The vast coal deposits of Pennsylvania, Ohio, and West Virginia, Virginia and Kentucky, Indiana and Illinois, show in traveling over these varions fields the great development and how little virgin territory exists, the major portion of it being in the hands of other than the original owners, it being principally owned by the large coal and iron interests. The choice lands that are nearer the markets and better located as regards transportation have been purchased. A constant increase in price is bound to prevail with such a condition.

It is rather a startling fact which we are compelled to face in regard to coal, its limited area and rapid disappearance. In using coal we are trenching on Nature's capital and hastening an ultimate and inevitable end. Even admitting that there will be coal for many years, nothing is more sure or certain than that prices are advancing and will continually, steadily and gradually continue on an upward plane. Coal is the chief factor in modern civilization. Nearly all labor-saving machines must have coal to make them effective. Outside of man and brute animal force, the sources of power available for us rises from the use of coal. If coal is too remote from a market, no matter how good in quality or what amount, its use is prohibitive.

Some high authorities state that we have fuel for a long period to come, but how long will it be commercially and economically located? Go into any of the fields in Northern and central Pennsylvania where coke is made,—the mines in the Freeport beds along the Allegheny River, the Clearfield, Indiana, the Pocahontas, Kanawha, Fairmont, Pittsburgh No. 8, Massillon district, Hocking Valley district, Somerset, Indiana, Illinois, Tennessee, Alabama and Kentucky, and you find large developments, and, in the main, with the choice fields both as to quality of coal and location, owned and controlled by coal, railroad, steel and other interests. It is hard to find virgin territory for an operation.

Mr. H. C. Frick, one of America's representative men, looked far ahead in the coal, coke, iron and steel situation, just as he does in his many other diversified interests. The result is millions of gain for himself and his associates.

COMBUSTION

Our coal areas are being rapidly depleted. It is evident upon every hand. The continually increased consumption is practically the cause. The government has observed that our present systems of combustion are extravagantly wasteful, and the result of the coal testing plan shows that means of obtaining more energy from our coal should be had. They also appreciate the situation and are desirous of knowing how some of our poorer coals and lignites which are considered of but little value now, can be utilized. The waste of the energy of fuel is almost beyond comprehension in an age where economy and practical methods at every point should be used. As it is, 5% to 7% of the energy in fuel is obtained; the remaining 93% to 95% going up the chimney through wasteful methods of consumption.

At the fuel testing plant these conditions are easily observed by the methods of firing the various fuels. Many of the consumers of coal have neglected this point. Trained experts have worked making a study of the coals which contain too much ash or sulphur to be economically used for commercial purposes. The time will necessarily come when these impure coals will be used, but will have to be greatly improved by washing and other means of chemical preparation. This will enable the use of many low grade coals. Even this will necessarily mean great expense and cost, but it is very important at this time that such procedure and investigation were being made.

The more important coal beds, especially near the points of consumption, have been largely purchased and are being held and operated by coal interests. Many of the latter have made large purchases readily, having seen the ultimate future in the coal situation. As long as the better and thicker seams of coal are available, it is hardly likely that the thin and less pure seam is going to be operated to any great extent. An old Pittsburgh seam operator will give but little consideration to the use of any other seam as long as there is any of the thick coal to be had. This has been observed in the past eight or ten years in the Pittsburgh district, and is an approved fact. These experiments with thin and dirty coal are scientifically, economically and commercially proper and should be continued. While the results will be commercially valuable at the present time to many districts in the West where they have thin barren measures, in the Pittsburgh district it will be of little interest commercially for the present, affording better the results tending to stop the great waste in careless and extravagant systems of combustion at present in vogue. You may in a way curb the smoke, and secure more heat units from the coal by better method of combustion, but it looks like a hard task to try and convert low grade coal and old dumps into marketable stuff. Not in Western Pennsylvania as long as we have the Pittsburgh bed in Greene and Washington counties practically untouched.

The situation with our large coal companies may be illustrated by stating that the Pittsburgh Coal Company has 165,000 acres of coal lands, some of them better located than others for economical operation and quality of coal. Considering them all available and of a thickness that would net seven thousand tons per acre, with an output of 15,000,000 tons per annum, it is figured that the coal will last for a period of seventy-five years; but this is not safe, partly because of not being able to save all the coal, loss in mining; and then again if its output is increased in the same proportion as the output in the last twenty-five or thirty years, it would not last forty years, if they get their proportion of the trade.

Another example of the rapid disappearance of our Pittsburgh coal bed is to be seen in traveling up the Monongahela River to the remains of many dismantled and burned down tipples with their supply of coal worked out. Many places along the river front long hauls have to be made underground in order to keep up their supply.

It is predicted that one-half of the mines now being operated on railroad and river in the Pittsburgh or Connellsville seam of coal will be obsolete in the next ten years, notwithstanding the fact that during the past decade many new mining operations have been opened.

VARIETIES OF COAL

There is lignite, stone coal, camel coal, bituminous coal, semi-bituminous coal, semi-anthracite and anthracite coal. These different varieties are caused by various conditions. Most of the changes relating to bituminous, semi-anthracite and anthracite is because of eruptive heat. The various others have been made what they are by other conditions jointly with eruptive heat. The normal condition of bituminous coal is what we find in Southwestern Pennsylvania. The Connellsville field, being near the upheaval of mountains, may have been affected by the heat more than the territory as we go West to the Ohio River. It is the various degrees of heat to which the vegetable beds were subjected, and their physical condition and after influences that causes the several different qualities of coal to exist. This, together with the atmospherical and physical conditions, gives us what we have in the way of coal measures.

All that is needed to make Greene County coal into the best of coke is intelligent application and consideration of the quality of coal being dealt with. This will mean close study of the analysis of the coal together with the best process of coking same. There is no reason but that the territory in question can be adapted for making metallurgical coke. The bituminization is not too high to assure good coke.

From the analyses and examinations made of the coke on the West side of the Monongahela River opposite Fayette County, it is found that the coal has all the necessary elements with their proper and various fusion in the coke oven.

FREEPORT COAL

The Freeport vein of coal has been described as valuable in the Pittsburgh District. It is quite probable that it will be mined to great extent in the future, and that at a not very far distant period. It is true that it will be mined under more unfavorable circumstances than is that of the Pittsburgh bed. It is frequently found to be irregular and uncertain in thickness and in quality. This uncertainty prohibits in a way continued and regular development.

HISTORY OF CONNELLSVILLE REGIONS

Quoting Mr. F. C. Keighley on History of Connellsville Regions, written in 1900:

"The geologist tells us, that once, ages ago, a great sea spread all over the beautiful valleys and hills of what is now the Connellsville coke region. In this great sea, for ages there was deposited (and also grew within its bosom) great sheets of rank, luxuriant vegetation that can only be compared with that mass of vegetation that Columbus met with in his voyage of discovery, and that still exists in the tropical seas, and is known as the "Saragossa Sea.". As the ages rolled on, this sea sank down and the great Allegheny mountains thrust forth their mighty flanks, the great sheets of vegetable matter were covered with sedimentary deposits, and in time became the seam of coal which is now known as the Connellsville seam. So much for science, which is really as much matter of history as the facts that follow.

For the next that I have been able to find, I am indebted to Mr. Thomas Lynch, president of the H. C. Frick Coke Co.

It seems that, 'In 1816 and 1817, Isaac Mason built the first rolling mill erected West of the Allegheny mountains, to manufacture iron at Plumsock, Fayette County, Pa. This mill went into operation September, 1817, and coke was used in the refinery. This is the first definite statement that can be found concerning the use of coke in this country.' It seems that the coke industry really began within the confines of Fayette County.

In 1837 F. H. Oliphant made coke at his Fairchance furnace, near Uniontown, Pa. All the early coke was made on the ground, in what was known as coke ricks.

The first coke made in ovens was in about 1841. In that year Provence McCormick and James Campbell, two carpenters, and John Taylor, a stone mason, commenced making coke with two ovens, and in the spring of 1842 had enough coke stocked to fill two boats, or about 800 bushels which they took down the river on a high stage of water, to Cincinnati, Ohio. On reaching that city, they found that the demand for coke was not as brisk as they hoped to find it. The new fuel was unknown there; foundrymen regarded it with suspicion, calling it "cinders.' Campbell, who went with the boats, remained at the landing three weeks, retailing out one boat load in small lots at 8 cents per bushel. He

traded the balance to Miles Greenwood, a foundryman at Cincinnati, for a patent iron grist mill. This mill was brought to Connellsville, Pa., and when put in operation, was found to be a failure; it was sold for $30; and so ended the first coke manufacturing firm in the Connellsville coke region. A part of their cargo, which had been traded for the patent mill, was afterward boated to Dayton, Ohio, and was there sold to Judge Gobbard, a former resident of Pennsylvania, who then had a foundry in operation at Dayton. He used the coke in his establishment and found it so well adapted for his purpose that he soon after came to Connellsville and proposed to Campbell and McCormick to make more; but the result of their previous venture in the coke trade satisfied them.

In 1843 the ovens built by Taylor were rented to Morcedai, James, and Sample Cochran, who used them in making 24-hour coke. When they had coked about 1,300 bushels, it was boated to Cincinnati and sold to Miles Greenwood, who in the meantime had become acquainted with the value of coke as a fuel.

About 1853 three or four ovens were built and put in operation by Stewart Strickler, the product being boated to Cincinnati and sold. For some years but little coke was made, though a few ovens were built, and that knowledge acquired, that was necessary for the coming development of the trade.

The trade increased somewhat in 1851, and in 1855 there were but 26 coke ovens above Pittsburgh. It was not until the Baltimore & Ohio Railroad was completed in Pittsburg, and Connellsville coke had been used successfully in the Clinton furnace at Pittsburg, that its value as a furnace fuel was fully demonstrated and the foundation laid for the demand which has resulted in such an unprecedented development of coke manufactured in the Connellsville coke region. The Clinton furnace was blown in about 1859 to make pig iron from coke. The coke was first made from Pittsburg coal near the furnace on the south side of the Monongahela river. It was run about 3 months, the coke proved unsatisfactory, the furnace was blown out, and arrangements made to secure a supply of coke from the Connellsville region. The furnace was again put in blast in the spring of 1860, using coke made from the Fayette Coke Works, comprising about 30 ovens which were also erected in that year. (Mr. George Griscom, whom so many of you know, tells me that he was superintendent of the Fayette Works, if I remember rightly over 30 years ago. This would, I think, make him one of the first, if not the first, superintendent of the region.) Forty ovens were built in Hichman run in 1864. The product of these ovens was transported on a tramway to the Pittsburg & Connellsville Railroad until 1871, when the Hickman Run Branch Railroad was built. In 1860, the Connellsville Gas, Coal & Coke Company, was organized, and built 40 ovens near Connellsville. In 1869, 40 ovens were built near Dunbar, Pa. The Works above named were about all the ovens in the Connellsville region, up to 1871.

The United States Census Reports for 1850 show that there were but four establishments making coke in the United States up to that time. In 1860 there were 21; in 1870 there were 25. The number of establishments returned in 1850 is probably not correct. It is true the manufacture of coke at that time was in its infancy in this country; but it was without doubt more of an industry than the returns of 1850 indicate. The census returns for 1850 and 1860 show that all the coke produced in the United States was made in Pennsylvania; and in 1870, 92 per cent.; 1880, 84.18 per cent.; and of the whole quantity made in Pennsylvania, Westmoreland and Fayette counties, or the Connellsville coke region, produced 73.16 per cent.

In 1871 the Mt. Pleasant & Broad Ford Railroad (of which Mr. H. C. Frick was one of the projectors) was built, which opened up the northern ends of the region, and inaugurated the construction of several plants. In the same year Mr. H. C. Frick and his associates operating under the name of Frick & Co., started into the coke business with 300 acres of land and 50 ovens known as the Frick Works. In 1872 the Mt. Braddock, Jimtown, and Valley Works were built, and about the same time Frick & Company added 50 ovens to the Frick plant and built the Henry Clay Works of 100 ovens on the Youghiogheny river near Broad Ford. Oven building continued until the total number in 1873 was 3,673.'

I will now follow Mr. Lynch's data by reference to the Geological Survey of Pennsylvania, dated 1876, I find that the number of coke plants in existence in the Connellsville coke regions at that time is given as 45, the number of coke ovens as 3,578, and the weekly output at 26,000 tons. It is further said that in that report that 'Perhaps the most surprising feature of this enormous business is its sudden and recent growth; nearly all of these ovens having been built within the last 10 years.'

Before 1865 the trade was small, the market chiefly local to the Pittsburg trade, the reputation of the coke much less widespread, and the number of coke ovens growing slowly. Since that time the increase of the business has been amazing.

Other coking districts have enlarged their capacities also; much coke, and of good quality, too, now coming from the line of the Pennsylvania Railroad from Blairsville to Pittsburg.'

You will observe that the writer just cited states that the increase in the coke business to 26,000 tons per week was amazing. What would he say about the present output of 200,000 tons per week now being marketed? This marks an increase of eightfold in only 23 years.

Referring to Mr. Lynch again:

'In this year (1873) the great financial panic occurred, and the iron business commenced to decline; the price of coke naturally went down in sympathy with it until 1879; then came a sudden and unprecedented demand, and prices, which had previously ranged for several years from 90 cents to $1.15 per net ton at the ovens, advanced to $5 per ton. This boom naturally gave impetus to the coke trade, and on May 31, 1880, there were 6,237 ovens built, and 1,242 in the process of construction in the region.'

This brings us up to 1880. Through the kindness of my friend, Mr. E. W. Parker, statistician of the United States Geological Survey, Washington, D. C., I am enabled to present to you the following statistics relative to the manufacture of coke in the Connellsville coke region from the end of 1880 to the end of 1898:

From a review of the statistics just given, it seems that from 1880 to 1883, the coke output rose from 2,205,946 tons to 3,552,402 tons, or an increase in three years, of 61 per cent.

In 1884 and 1885 the trade declined, and at the end of 1885 the output was 456,390 tons down as compared with 1883. In 1886 it suddenly jumped up over 1,000,000 tons as compared with 1885. In

1887 it dropped back slightly—33,532 tons. In 1888 it increased again over 800,000 tons. In 1889 and 1890 it rapidly advanced again, and at the end of 1890, as compared with 1887, it had increased 2,317,167 tons. In 1891 it fell back again 1,703,491 tons. In 1892 it recovered itself and regained 1,568,787 of the 1,703,491 lost in 1891. In 1893 it plunged back lower than its record of 1888—5 years before—and lost in output, compared with 1892, 1,523,829 tons. In 1894 the output rose again and recovered 386,457 of the 1,523,829 tons lost in 1893. In 1895 it took an immense leap forward, gaining in one year the amazing amount of almost 3,000,000 tons. In 1896 there was another slump down of 2,718,689 tons. In 1897 it gained over 1,400,000 tons. In 1898 it gained 1,454,524 tons, bringing the output up to January 1, 1899, to the enormous sum of 8,315,350 tons. The figures for 1899 are not yet known, but I should estimate it at an increase of over 1,000,000 tons; for, as before stated, the present output is at the rate of 10,500,000 tons per annum.

Nothing can better illustrate the progressive character of the men that conduct the coke industry, than the fact that one firm—the H. C. Frick Coke Company—has in 28 years increased its holdings from 300 acres of land and 50 coke ovens to 40,000 acres of coal, and now control the products of 52 plants in the region, aggregating 11,200 ovens, and four water plants with a pumping capacity of 8,000,000 gallons of water daily. For the equipment of its plants, it has 52 miles of railroad track, 28 locomotives, 2,500 railroad cars, 92 pairs stationery engines, 42 miles of wire rope, 198 steam boilers, 5,100 mine cars, 280 miles of mine track and 740 horses and mules. It is supplied with coal from 50 mines, 22 drifts, 15 slopes and 13 shafts. The latter vary in depth from 50 to 542 feet; slopes vary from 180 to 6,600 feet horizontal depth, and some of the drifts extend over 2 miles underground.

The coking coal field of itself is of limited area, and extends from a point near Latrobe, on the Pennsylvania Railroad, in a southwesterly direction, through Westmoreland and Fayette counties, a distance of 42 miles almost to the West Virginia line, with an average width of 3.5 miles, covering an area of 147 square miles and, excluding barren measures originally contained 88,000 acres, of which there are yet (I will say January 1, 1899) as near as I can ascertain, about 62,000 acres of available coal yet to mine. At the present rate of production, this coal would last 50 years, but if it should increase in the ratio that it has in the past 10 years, it would be exhausted in 25 years. This 62,000 acres of coal at $1,500 per acre, which is now considered a fair figure, would make its value at the present time the enormous sum of $93,000,000. At one time Connellsville coking coal sold for $12.50 per acre, so it has increased in value 120-fold. As shown by Mr. Parker, 'the value of the coke manufactured in 1898 was $12,626,292.' I estimate that for the year 1899, owing to the increased production and advance in prices, the value of the coke manufactured will reach well up to $20,000,000. The Connellsville coke industry furnishes directly, employment to over 20,000 men, and indirectly to several hundred thousand. These figures of themselves are astounding; yet I am going to furnish some that are still more marvelous.

Ten million tons of coke per annum means the consumption of 15,000,000 tons of coal, to which we must add at least 1,000,000 tons more to cover what is used about the mines, and the wastes of various kinds incurred in handling. This does not include what is lost in bad mining. This brings the sum total of coal per annum to 16,000,000 tons, 5,000,000 tons of this amount is thrown into the atmosphere in the shape of volatile matter, which in turn contains many valuable by-products, such as ammonia, tar, gas, heavy and light oil, benzole, toluol, xylol, phenol, naphtha, anthracene, creosote, pyridine, pitch, etc. Of ammonia alone not less than 50,000 tons were thrown into the atmosphere during the year 1899, by coke ovens of the Connellsville region, no doubt adding materially to the fertility of our land; for nature never wastes anything, and it is in all probability precipitated.

Sixteen million tons of coal per annum mean practically 52,000 tons of coal per day. If we throw this into its equivalent horse power, at the rate of two pounds of coal per hour per horse power, which is now developed in high class engines, it would equal the work of 520,000 horses, working ten hours per day under the Watt standard, which is one-third greater than the real horse power, making an actual horse power of 78,000, or equivalent to the work of 7,800,000 men for ten hours. Scientists tell us that, as yet, we get but ten per cent. of the actual power contained in a pound of coal, so a day's work of the Connellsville coke region is really a consumption of force equal to that exerted by 78,000,000 working men, or more than the whole population of the United States.

During the past twenty years, in which I have been connected with the coke industry, I have time and again heard iron and steel makers explain that they have found other coke that answered their purpose, but I have always noticed that they were in the market for Connellsville coke when they had to make a fine grade of iron or steel. Every time a man or company found a new coal field, they came out with the glowing statement that it was as good as Connellsville coal. Why, I have seen alleged Connellsville coal and coke from every section of Pennsylvania, Ohio, West Virginia, Virginia, Illinois, Indiana, and even Pacific Slope, and here is the latest Klondike right at our doors basing its future greatness on the reputation of Connellsville coal. The fact is, that every one is anxious to prove that he controls a field of genuine Connellsville coal, no matter whether it is located on the top of Pike's Peak or in the Dismal Swamp.

As to cheapness of production. There is no other coal as regular, as uniform, of as convenient thickness, as Connellsville coal, and as easily mined. These are not mere statements, but facts; facts that have made Pittsburgh the steel center of the world; facts that have taxed the three great railroad systems of southwest Pennsylvania to their very uttermost; facts that have in thirty years brought up the output of blast furnaces from 35 tons to 700 tons per day; and facts that are going to make the United States the greatest nation on earth."

FRED C. KEIGHLEY, 1900.

What a vast increase in production since 1900?

COKE HISTORY

The history of the Connellsville fields can best be written by noting the thousands of ovens and their large production; also the prices at which these lands are held:

In 1879 coal was optioned at Leisering No. 1 at $25.00 to $30.00 per acre. It was resold to the Leisering interests later at ninety dollars per acre. This was their first purchase—made on January 1st, 1880. Twenty-seven hundred acres at Leisering No. 3 was purchased by the Leiserings at seventy-five dollars per acre. This same coal to-day or coal nearby could not be purchased for three thousand dollars per acre. The fact is, strictly speaking, there is none in the Connellsville region proper that could be gotten at three thousand dollars per acre, and in the lower field known as the Klondike (which has only been developed in the past seven or eight years) there is not more than two thousand acres, and nothing that can be purchased for less than fifteen hundred to two thousand dollars per acre.

In July, 1899, Mr. J. V. Thompson sold John W. Gates for his steel and wire interests five thousand acres at $170.00 per acre. In 1907 Mr. Thompson paid $1,700.00 per acre for adjoining coal.

In 1898 coal was offered at $50.00 an acre on Dunlap Creek, which is the scene at present of extensive operations. The entire surrounding territory could have been purchased at that price. There is practically nothing available there at this time at any price.

With nothing more available in these fields it is natural that adjoining territory or extension of same be looked into. As you go South across the Fayette County line into West Virginia, on the east side of the Monongahela River, you find but little coal of the Connellsville or the Pittsburgh vein. The Freeport measures outcrop there and some coke has been made. The nearest coal of merit to be obtained is naturally the field on the west side of the Monongahela River opposite Fayette County. The many developments along the river from Coal Center to the West Virginia state line show the availability and merit of this coal.

The Lackawanna Steel Company have about six hundred ovens at or near Ellsworth. They are making an excellent quality of coke, the sulphur, phosphorus and ash being low.

The Ellsworth Company purchased seven thousand acres of their coal for $37.50 per acre in 1899, and the Lackawanna Steel interests paid at least six hundred dollars per acre for their proposition in 1907.

In November, 1906, Mr. J. V. Thompson sold two thousand acres in Luzerne and Redstone townships, Fayette County, to the Tower-Hill Connellsville Coke Company at a price of $1,-700.00 per acre. Prominent coal and financial interests in Uniontown, Cleveland and the east were the purchasers. This was about the last large sale made on the Fayette County side. At the present time small acreage is left.

In 1899 the acreage between Uniontown and Brownsville sold at one hundred dollars an acre. This is along Redstone. Some of this coal a year or two before was purchased at fifty dollars an acre by the Redstone Coal & Coke Co. This is the district in which is located about seven thousand acres of coking coal owned by the Pittsburgh Coal Company, and is shown as far as earning value to be its main asset in 1905.

In the district where the Washington Coal & Coke Company was optioned up at twenty to thirty dollars per acre in 1880, the only available coal now can be included in fifteen hundred acres, and this is mainly owned by Alfred M. Fuller, and it is hardly probable same could be bought at even fifteen hundred per acre.

There is no coal to be had in the Greensburg, Latrobe, Scottdale, Mt. Pleasant district; in fact, none in the old Connellsville region; none in the Redstone district; but little than mentioned above in the Washington Run territory, and outside the old basin in the Monongahela River or Klondike field two or three thousand acres will probably include all the

desirable coal that could be acquired unless it be purchased of some operation or interest at a good figure. The coal remaining that is desirable is mainly owned and controlled by coal and iron interests.

In summarizing the coking coal situation as far as western Pennsylvania and eastern Ohio is concerned, the only territory open for future operations is eastern Greene and eastern Washington counties.

In the Pleasant Unity district, that is from Mt. Pleasant to Latrobe, the coal was not considered good in early days. Near Hunkers Mr. Thaw purchased some at eighty dollars per acre. To-day the price would be not under three thousand dollars.

DEVELOPMENT AND PRODUCTION IN CONNELLSVILLE REGION

(SOUTH CONNELLSVILLE FIELD)

In the spring of 1900 wonderful developments in new territory near Masontown, Fayette County, were made. The Bessemer Coke Company burned the first coke in the new territory. The Eureka Fuel Company had ovens in blast soon thereafter. The strangest thing about this industrial romance is that such valuable coal should have lain so long undiscovered.

Early developments were confined to the region from Greensburg to Connellsville, and at last the whole territory from Greensburg to Smithfield was being developed; now all of western Fayette County is lighted by thousands of ovens. In 1898 the Illinois Steel Company began to make experiments with coal at the basin which begins 2 miles west of the western outcrop of the old Connellsville coal vein and extends westward into Greene County. This basin outcrops along the line running from High House to New Salem and keeps dipping as it goes west. At the Monongahela River it was then thought to be about 200 feet below the surface and almost 500 feet at Waynesburg. This company found that this coal would coke into a superior quality of fuel. They secured about 7,000 acres along the eastern outcrop of the new field. Some of the options were taken as low as $35 per acre—the latest purchases have been nearer $2,000. American Steel & Wire Company gathered up most of the territory stretching from the Illinois Steel Company holdings westward to the Monongahela River; they secured over 8,000 acres. Many others entered this field. In short time an enormous output was produced.

Three distinct systems of railroads have entered this new Klondike field, and these are just across the river from the virgin territory of Greene County. It is quite probable that the Pennsylvania will build up on the west side of the river but how far has not been determined. When wise capitalists appreciate or realize the grand opening in Greene County for similar propositions another such movement will be made.

COKE OUTPUT—PRODUCTION

The coke production of the Connellsville and Lower Connellsville region during 1906 was approximately 20,000,000 tons, with a market value of $55,000,000. It exceeded last year's business, or any previous year's business, by 37½ per cent. It took 745,274 cars to transport it.

In 1906 the by-products of the coke establishments formed only 5.3 per cent. of the total value of products in 1905. They increased 186.4 per cent. in value between 1900 and 1905. At the last census of by-products the coke ovens consisted chiefly of tar valued at more than $600,000; amonius sulphate valued at over $800,000; ammonia liquor, $760,000, and sulphur gas valued at $840,000. 2,225,000 tons of coke were exported principally to Canada, Mexico and Cuba. In 1906 Westmoreland County produced 26,000,000 tons of coal. This was

an increase of 3,000,000 tons over 1905 when it was thought the high water mark had been reached, and it would even been greater then had there been more cars to handle the output. The outlook this year is good and some operators estimate that the output should reach 30,000,000 tons in Westmoreland County alone.

The coke output in 1907 in Westmoreland will show an increase of over 1,000,000 tons on account of the number of new ovens being in operation.

UNITED STATES STEEL CORPORATION'S COAL AND COKE PRODUCTION IN 1906

The annual report of the Steel Corporation shows that during the year 1906 it produced more than 13,000,000 tons of coke, and mined almost 2,000,000 tons of coal exclusive of that used in coke production.

They also constructed more than 2,000 Beehive coke ovens besides extensive improvements in their by-product coke plant at Sharon, putting in a coal crushing and mixing plant.

The Steel Corporation owns nearly all the coal in the old Connellsville field and have a fair representation in the lower field. In the old field they have been forced to suspend operations from several hundred ovens in the past year or two, and many estimate after a tour of the old basin in the Connellsville region that the supply will be almost exhausted within twelve to eighteen years; some even in less time than that. Of course, there may be a few plants that will have a longer existence because of the larger body of coal surrounding their immediate plant, but in observing the change that has been made in the past ten years will see the condition predicted above in a comparatively short time. The large developments and large outputs will be from the lower field, and in rapidly exhausting them, eastern Greene and eastern Washington counties will be next, and it will come in the very near future.

TAKEN FROM 1906 ANNUAL REPORT OF PITTSBURGH COAL CO.

PRODUCTION AND SALES—IN TONS OF 2000 POUNDS EACH

(Including Sundry Purchases from other Producers)

	Pittsburgh District Coal	Hocking District Coal	Total Coal Exclusive of that used in manufacturing Coke	Pittsburgh District Coke
Sixteen months ending Dec. 31, 1900.	18,543,816		18,543,816	30,004
Year 1901.....	12,988,347		12,988,347	19,987
Year 1902.....	14,290,277	1,381,996	15,672,273	67,730
Year 1903.....	15,581,397	1,480,350	17,061,747	149,842
Year 1904.....	13,678,658	1,451,505	15,130,163	219,131
Year 1905.....	14,084,682	1,371,620	15,456,302	339,490
Year 1906.....	17,628,396	1,415,920	19,044,316	429,076
Totals	106,795,573	7,101,391	113,896,964	1,255,260

TAKEN FROM 1906 ANNUAL REPORT OF PITTSBURGH COAL CO.

COAL LAND ACREAGE

COAL LANDS OWNED

	Acres of Unmined Coal at Jan. 1, 1906	Acres Purchased During Year	Acres Mined out or Sold during Year	Acres of Unmined Coal at Jan. 1, 1907
PITTSBURGH DISTRICT.				
Pittsburgh Vein—				
Coking	7,989	...	432	7,557
Thick Vein	13,445	100	435	13,110
Thin Vein Gas...	24,893	200	584	24,509
Thin Vein Steam.	99,234	164	778	98,620
Total Pittsburgh vein	145,561	464	2,229	143,796
Freeport and other Veins	42,425	...	....	42,425
HOCKING DISTRICT.	8,379	...	164	8,215
Total	196,365	464	2,393	194,436

COAL LANDS MINED UNDER LEASE

	Acres of Unminded Coal at Jan. 1, 1906	Acres Leased during Year	Acres Mined during Year	Acres of Unmined Coal at Jan. 1, 1907
PITTSBURGH DISTRICT.				
Pittsburgh Vein—				
Thin Vein Gas...	3,042	...	155	2,887
Thin Vein Steam.	21,543	...	205	21,338
Total Pittsburgh Vein	24,585	...	360	24,225
HOCKING DISTRICT.	2,159	...	126	2,033
Total	26,744	...	486	26,258

RECAPITULATION

	Acres of Unmined Coal at Jan. 1, 1906	Acres Purchased or Leased during Year	Acres Mined out during Year	Acres of Unmined Coal at Jan. 1, 1907
Owned	196,365	464	2,393	194,436
Leased	26,744	...	486	26,258
Grand Total	223,109	464	2,879	220,694

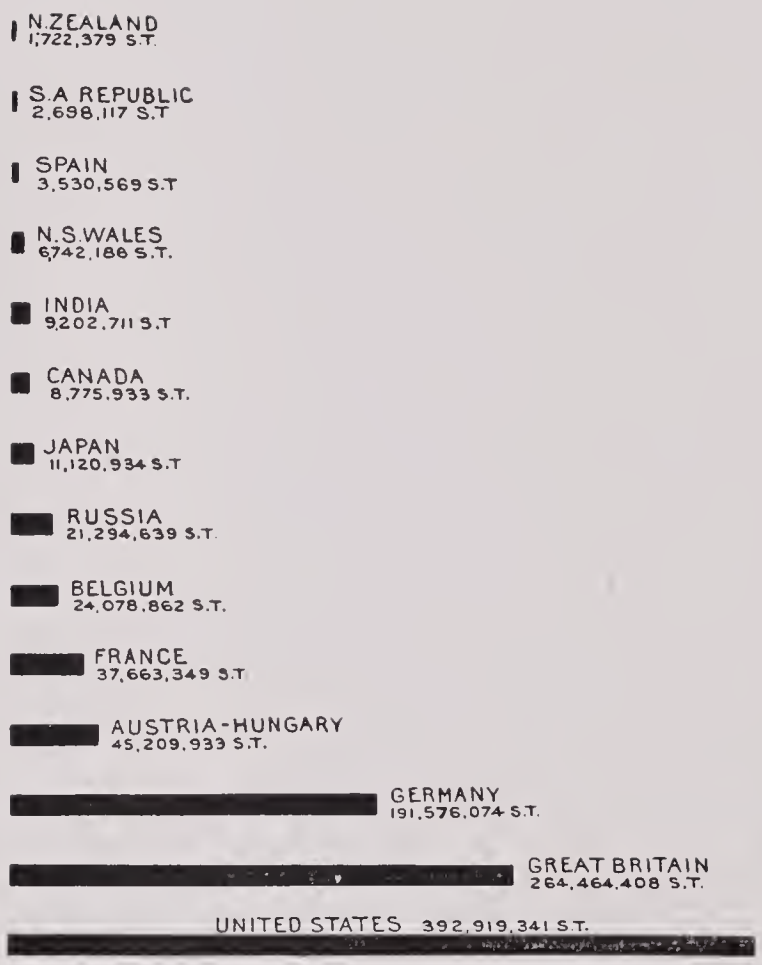


Diagram showing the output of the principal coal producing nations, 1905

Coal Output of Principal Coal Producing States, 1905

PRODUCTION

The total production of coal of the United States is more than four hundred and twenty-five million tons. This includes anthracite and Pennsylvania produced one hundred and thirty-five million tons of bituminous and seventy-seven millions of anthracite.

Production of Bituminous Coal according to United States Geological Survey:

United States:		Pennsylvania:	
1857	4,475,000 tons	1857	2,000,000 tons
1866	10,625,000 "	1866	6,800,000 "
1876	26,662,000 "	1876	12,880,000 "
1886	65,021,000 "	1886	27,094,000 "
1896	120,641,000 "	1896	49,557,000 "
1906	281,481,000 "	1906	135,000,000 "

With this continued increase, if we are to estimate how long the coal of western Pennsylvania is to last us, we just take into consideration the increased production. It is plainly seen that Pennsylvania has kept up her share of the output in the increase, and if continued will rapidly deplete the bituminous area, especially that of the Pittsburgh bed in the southwestern part of the state, as it is more easily accessible for markets where there is large consumption of coal and coke.

During this increase in consumption, beginning with 1876, we exported .86% of the output; in 1906 we exported 2.54%.

The total production in the United States as given by United States Geological Survey was 414,000,000 tons in 1906, for which was received $512,000,000. This is quite a large fuel bill. The figures show an increase of more than twenty million tons, or 5.4% in quantity, and more than $35,000,000 or 7½% in value.

Of the total production Pennsylvania contributed more than 200,000,000 tons with a value of more than $262,000,000. The anthracite production in 1906 was 63,645,000 long tons, while the bituminous production was 129,263,000 short tons. The anthracite production in Pennsylvania in 1906 was 5,694,000 long tons less than in 1905, while the bituminous production showed an increase of 10,850,000 short tons.

Pennsylvania first in the list of production in the United States, and West Virginia supplanted Illinois as the second coal producing state.

Pittsburgh Coal Tonnage:

The production in 1906 was 48,949,000 tons, an increase of 7,100,000 tons over 1905, and an increase over 1904 of 12,500,000 tons. The production of coal for the past four years in the Pittsburgh district was 165,146,000 tons.

With Fayette, Westmoreland, Washington and Allegheny counties producing more than 75,000,000 tons of coal per annum, and with the same continued increase as there has been in the past twenty years, which averages 10% per year during each decade, at the end of ten years the four counties above named would be depleted of 20,000 acres per year of its coal area, or a total of 200,000 acres.

Fayette and Westmoreland produces two-thirds of the above amount. In 1904 Fayette County produced 19,231,011 tons, of which 12,552,780 tons were made into coke.

In 1905 Fayette County produced 24,250,989 tons, of which 16,112,687 tons were made into coke.

In 1901 Fayette County produced 16,187,224 tons.
In 1902 Fayette County produced 18,988,058 tons.
In 1903 Fayette County produced 19,613,161 tons.
In 1904 Fayette County produced 19,231,011 tons.
In 1905 Fayette County produced 24,250,989 tons.

The increase in 1905 being 5,019,987 tons, and from statements given 1906 tonnage will show a further increase.

In 1905 the United States produced more than five times the output of 1880, or multiplied its production five times in twenty-five years. In the coal areas in the various states and how they lay, or are distributed, as compared with our need, the true way to determine how long commercially it will last will be to calculate the solid acreage and then how much is depleted each year, together with the probable increase as we go along. The extra charge per ton that other fields will cost over Pittsburgh coal in order to reach a market will give southwest Pennsylvania the advantage always.

MARKETS

The markets for Pittsburgh coal is mainly Pittsburgh and 150 miles around, except where shipments are made throughout the lake region, and down the Ohio and Mississippi Rivers.

Pittsburgh has thousands of mills and manufacturers, and with its million dollar a day pay roll, with its many blast furnaces and rolling mills, with its thousands of workingmen, make certain the future great need of the Pittsburgh coal bed. There can be but little abatement in the demand for bituminous coal.

TOTAL LAKE TONNAGE

Our coal tonnage to the Lakes in

1901	6,870,000	tons
1902	8,700,000	"
1903	11,350,000	"
1904	9,890,000	"
1905	11,130,000	"
1906	14,510,000	"

The coal shipped to the Lakes from the Pittsburg district means approximately 10,000,000 to 12,000,000 tons, and that shipped from the West Virginia and Ohio district is far behind.

COKING COAL PRODUCTION

The Lower Connellsville region, no older than it is, has produced one-half the tonnage of the old Connellsville region.

Briefly, the exact figures of production of coke in 1906, are as follows:

32,568,926 tons, of which Pennsylvania produced 20,750,000 tons.

Requiring approximately 32,000,000 tons.

PRODUCTION IN CONNELLSVILLE REGION

There are approximately 35,000 coke ovens in the region and an output of more than 20,000,000 tons. They are producing 60% of the coke of the whole United States and 90% of the coke produced in Pennsylvania. To haul all this output it takes more than 740,000 cars.

The deepest shaft to reach coal is 650 ft. and the longest slope is Redstone, said to be 10,000 ft.

PRODUCTION

(PENNSYLVANIA BITUMINOUS COAL)

Quoted from E. W. Parker's report (U. S. Geological Survey, 1905).

The record made in the bituminous coal fields of Pennsylvania was something unprecedented in the history of coal mining. Not only was the production the largest ever obtained in the State, but the increase over the preceding year surpassed all previous records, and was more than the total production of any other State in 1905, with the exception of Illinois, Ohio and West Virginia. In 1902 when the production of bituminous coal was unduly stimulated by the great strike in the anthracite regions, the output exhibited a gain of 16,268,421 short tons over that of 1901, and this was considered an extraordinary record. In 1905, without any such unusual conditions, the production shows an increase over 1904 of 20,475,350 short tons, an amount larger by more than 2,000,000 tons than the entire bituminous coal product in the State in 1880. That this remarkable increase is due in great measure to the iron industry, which also increased phenomenally last year, is shown by the fact that more than two-thirds of the gain made in 1905 over 1904 was in the amount of coal made into coke, which increased from 20,868,368 short tons in 1904 to 27,926,282 short tons in 1905, a gain of 7,057,914 tons, or 34.7 per cent. The percentage gain in the total production was 21, while the value increased 20 per cent. The two counties of Fayette and Westmoreland, which embraces the Connellsville coking districts, were responsible for nearly half of the total increase for the State, these two counties alone showing a gain of over 9,300,000 short tons in 1905. Their combined production exceeded by several million tons the total output of Illinois or West Virginia, which rank next to Pennsylvania as coal-producing States. The increased production was, however, distributed generally throughout the State, but in less proportion than in the two counties mentioned. Six other counties, Allegheny, Cambria, Clearfield, Indiana, Somerset and Washington, each recorded an increase of over 1,666,000 tons.

The total production in 1905 of the United States was 392,919,341 short tons, and in 1906 over 400,000,000 short tons, and the spot value of $500,000,000. In the production of coal the United States in 1905 surpassed all previous records. Compared with 1904 the output in 1905 exhibited a gain of 41,102,943 short tons, or 11 7/10 per cent. in quantity.

The total increase in the production of coal in the United States was larger than the total production of France in 1904, or of any other foreign country except Great Britain, Austria, Germany and Hungary, and was almost equal to that last mentioned. The total production of this country in 1905 was almost 50% larger than that of Great Britain, which country, until 1899, was the leading coal producing country of the world. Statistics show that Great Britain has left only about 11,000 square miles of coal.

An interesting factor is shown in the statistics, issued by the Department of the Interior, that in each decade the output has been practically doubled. It also cites along with the great increase in production of coal in comparison with the increase in population.

In 1850 the per capita production of coal was 0.278 tons.
In 1860 the per capita production of coal was 0.514 tons.
In 1870 the per capita production of coal was 0.857 tons.
In 1880 the per capita production of coal was 1.42 tons.
In 1890 the per capita production of coal was 2.5 tons.
In 1900 the per capita production of coal was 3.53 tons, and
In 1906 the per capita production of coal was 5.00 approx.

In 1905 estimated the population of the United States at 83,000,000, the per capita production was found to have been 4.73 tons.

Practically the entire output of both the anthracite and bituminous coal of the United States has been consumed within this country, although in the past year foreign markets are being secured.

The growth of the coal mining industry in the United States compared with that of the other countries of the world since 1868 shows that during the period of 38 years the percentage of the world's total produced by the United States has increased from 14.32 to 38, and this country now stands far in the lead of the world's coal producers. It has been only seven years since the United States supplanted Great Britain as the leading coal producing country, and yet in that time the increase in this country has been so enormous that Great Britain can no longer be classed as a competitor. The production of the United States in 1905 was nearly 50% larger than that of Great Britain, more than double that of Germany, and nearly two and one-fourth times that of all other countries, outside of Great Britain and Germany, combined.

PENNSYLVANIA

Total production in 1905, 196,073,487 short tons; spot value $255,269,508.

Anthracite.—Total production in 1905, 69,339,152 long tons; spot value, $141,879,000.

Bituminous.—Total production in 1905, 118,413,637 short tons, spot value, $113,390,508.

In the production of both anthracite and bituminous coal in 1905, Pennsylvania exceeded any previous record and established a new high water mark. The largest output obtained prior to 1905 was won in 1903, when in order to make up for the shortage resulting from the strike in the anthracite regions in 1902 the production was unusually augmented and reached the then unprecedented total of 177,724,246 short tons, which included 103,117,178 short tons of bituminous coal, and 74,607,068 short tons (66,613,454 long tons) of anthracite. Under more normal conditions which prevailed in 1904, the total production receded to 171,108,976 short tons, of which 97,952,267 short tons were bituminous coal and 73,156,709 short tons (65,318,490 long tons) were anthracite.

The rapid growth of the bituminous coal production, compared with that of anthracite during recent years, has been marked and forms one of the interesting features connected with the statistics of the coal mining industry. Attention has been called to this in some of the previous reports of this series, and the following table has been prepared, showing the average production of Pennsylvania anthracite and of bituminous coal throughout the United States by five year periods for the twenty-five years from 1876 to 1905. It will be seen from this table that the average production of anthracite during the five years 1901-5 was 2.59 times the average yearly production from 1876 to 1880, and that bituminous production for the later period was nearly 7.5 times that of the earlier.

From 1876 to 1880 the average production of bituminous coal was 1.41 times that of anthracite, while from 1901 to 1905 bituminous production was 4.08 times that of hard coal. The reason for this comparatively great gain in bituminous production is not difficult to understand. For a number of years anthracite has been practically eliminated as a fuel for manufacturing purposes and its use has been almost entirely restricted to domestic consumption in the eastern states. And even for domestic purposes the products of bituminous coal, coke, and gas are competing more and more with anthracite in the markets of the larger cities and towns. Add to this the constantly increasing costs in the mining and preparation of anthracite and ample reason is furnished for the existing statistical situation.

PRODUCTION OF ANTHRACITE AND BITUMINOUS COAL SINCE 1876, BY FIVE-YEAR AVERAGES

(Short Tons)

Period	Anthracite Quantity	Bituminous Quantity
1876-1880	25,800,169	36,460,776
1881-1885	36,198,188	71,092,930
1886-1890	43,951,763	94,446,451
1891-1895	53,405,187	125,416,327
1896-1900	55,625,265	171,498,143
1901-1905	66,853,778	272,542,704

Until 1902 Pennsylvania has enjoyed uninterruptedly the distinction of producing more than one-half of the entire output of coal of the United States. The shortage produced by the anthracite strike reduced the percentage in Pennsylvania to a total in 1902, of 46%. Notwithstanding the increased production in 1903, the tonnage of the state in the latter year was still slightly less than half of the total for the United States, and in 1904 Pennsylvania's percentage of the total was 49. The increase of nearly 25,000,000 tons in 1905 over 1904 has, however, reinstated Pennsylvania in this respect with almost exactly 50% of the total output of the United States. In 1880 Pennsylvania produced 66% of the entire output of the United States, and while this percentage has showed a decreasing tendency since that time the average for the last 24 years has been nearly 55% of the total. Pennsylvania alone produces more coal than any other country in the world, with the exception of Great Britain and Germany, and exceeds the combined production of Austria, France, and Belgium, which rank respectively as fourth, fifth and sixth among the coal producing countries of the world. The following table shows the total production of Pennsylvania and of the United States since 1880, with the percentage of the tonnage produced by Pennsylvania in each year:—

PRODUCTION OF PENNSYLVANIA COAL COMPARED WITH TOTAL UNITED STATES, 1880-1905

(Short Tons)

Year	Total United States	Pennsylvania	Percentage of Pennsylvania to total
1880	71,481,569	47,529,711	66
1881	85,881,030	54,320,018	63
1882	103,285,789	57,254,507	55
1883	115,212,125	62,488,190	54
1884	119,735,051	62,404,488	52
1885	110,957,522	62,137,271	56
1886	112,743,403	62,857,210	56
1887	129,975,557	70,375,857	54
1888	148,659,402	77,719,624	52
1889	141,229,514	81,719,059	58
1890	157,788,657	88,770,814	56
1891	168,566,668	93,453,921	55
1892	179,329,071	99,167,080	55
1893	182,352,774	98,038,267	54
1894	170,741,526	91,833,584	54
1895	193,117,538	108,216,565	56
1896	191,986,357	103,903,534	54
1897	200,223,665	107,029,654	53
1898	219,976,267	118,547,777	54
1899	253,741,192	134,568,180	53
1900	269,684,027	137,210,241	51
1901	293,299,816	149,777,613	51
1902	301,582,348	139,947,962	46
1903	357,356,416	177,724,246	49.7
1904	351,816,398	171,094,996	49
1905	392,919,701	196,073,487	50
1906			

RIVER COAL PRODUCTION

That which passes Lock No. 3, plus the coal mined in 1st and 2nd pool, makes total river traffic of 10,000,000 tons a year. This is without the river coal consumption above Lock No. 3. A steady increase is assured, as there has been a gain for the past three or four years, and with the improvement of the waterways and other markets opened, will continue to increase in output.

MARKET PRICE OF COAL AND COKE

Bituminous coal for fuel has increased from 67c in 1899 to $1.15 and $1.25 in 1907.

PRICE OF COKE

During the six months past the average price of coke has been about $3.00 per ton,—January 1, 1907—July 1, 1907.

The price of coke April 20th, 1907, was:

Foundry coke, $3.40 to $3.50 per ton;

Furnace coke, $2.60 to $2.75 per ton.

The total production for the week ending April 20th was nearly a half million tons. This is the output for the Connellsville district proper, the Klondike district, the Ligonier district, Latrobe, Greensburg and Irwin fields.

PRICE OF BITUMINOUS COAL

In 1886 the price of export coal at tidewater was $2.10; in 1896, $2.28; in 1906, $2.75.

COAL PRICES

With increased consumption and production and many new developments, coal prices are soaring.

To fulfill requirements above up-to-date methods are being used in mining coal and marketing same. The compressed air and electric mining machine, mechanical drill making a hole for the powder blowing down the coal, electric light in the mines, electric locomotives to haul the coal to the surface, automatic dumps, fifty-ton cars, drop bottom cars and machines that will dump whole carloads of coal, automatic conveyors, the modern coal barges on lake and ocean, all tend to enable the progressive ones in the coal business to make the supply answer the demand. Even with these, high prices are prevailing for both coal and coke.

If other districts had large fields of coal equal to that of the Pittsburgh district they would remain intact a long time. The Pittsburgh district will be more fully developed, and it is only a matter of comparatively few years that they can withstand the strain of such enormous production.

COKE DEMANDS

Certain we are that our industrial progress means large output of iron and steel products. The disappearance of our forests makes a broader market for these commodities. Then, because of this large demand which is sure to be present, the greater will be the inroads upon our coking coal supplies. The large coke producers have a bright future before

them. Large returns will necessarily result. The various coking coal people have accumulated large fortunes with but few, if any, exceptions. With good prices maintained and a possibility of much higher prices, coking lands are a safe and wise purchase. The prices as they are to-day make the production of coke an attractive proposition. The present supply will not meet the enormous demand for steel products, nor the future requirements in connection with the plants the steel people are building. This means a further increase.

BY-PRODUCTS OF COKE

The products derived in making coke are fuel gas, illuminating gas, ammonia and tar, and these after passing through the complex process of modern chemistry are resolved into many secondary by-products.

In the coking process part of the gas is consumed; the excess gas amounts to about 8,000 cubic feet for each ton of coal coked. On this basis the coal coked in this country last year produced an equal amount of gas as is produced from wells.

Much interest should be attached to the future of by-product coking plants and the great future worth of their products.

ANTHRACITE

As the immediate fields in the Anthracite District began to be depleted and old collieries abandoned, we quickly observed the increased price of remaining coal and of then present operations. It was then seen that there was but little that was not in the hands of the wealthy anthracite interests, and, in the main, parties identified with railroads were the owners.

The reason the anthracite fields have held out as they have may be noted in the following:

The anthracite trade practically did not begin until 1855; it was then used for making pig iron. Wood had been used as fuel in the homes, and charcoal in smelting ore in furnaces. From this on anthracite predominated until about 1875, and in 1870 more coke was used than charcoal.

The output of coke in 1859 came from less than fifty ovens. The big development did not begin until 1880. In 1867 there were about 14,000,000 tons of anthracite produced. In thirty years thereafter there was 50,000,000 tons produced, and in 1906, 64,000,000 tons. In 1904 there was 67,000,000 tons produced, which seemed to be the zenith of the anthracite coal production.

The output and demand has in the past twenty to thirty years been increased and has hurried the depletion of the anthracite coal areas until its maximum output has been reached. Many of the old collieries are becoming idle, and the result is this coal will rapidly go out of the market. The natural increase that will come to the bituminous coal areas for fuel, and increased use of coke because of same, together with the certain increased demands as our industries progress and as our nation becomes more thickly populated in numbers and becomes greater in wealth mainly from the development of our natural resources and other industries will continue to make our nation famous.

In January, 1901, the stockholders of the Pennsylvania Coal Company, an anthracite operation, received a letter from the banking house of J. P. Morgan & Co. in which an offer was made making the aggregate amount to be received by the stockholders at least 752%, or $376.00 per share, the par value of each share being only fifty dollars.

Note the millions of dollars of capital that have resulted from operations in the anthracite coal regions, also the largely capitalized railroads entering the same.

E. W. Parker, coal expert of the United States Geological Survey, says: "Hard coal will never be cheaper to consumers than it is now."

New York City uses fifteen million tons of anthracite annually, or a tonnage equal to the whole output of the Pittsburgh Coal Company, our largest bituminous coal company. This anthracite coal averages retailing in price from $5.00 to $5.75 per ton.

The use of anthracite coal in certain markets has an uncertain future. The abandoned breakers and depleted areas in the Hazelton and Lehigh region alone indicate that the future coal tonnage will diminish rapidly. It is true there are some seams in some of the collieries that are still virgin and untouched, but they are thin and can be worked to but little profit compared with the ones being operated at present. The fact is that much of the region has been gone over with its first mining. Just how long it will take to exhaust the coal in the anthracite district cannot be definitely determined; not near so easily as in the bituminous fields where the seams are more persistent and their extent better known. One thing is certain, the future tonnage of the anthracite district will gradually decline.

Because of the greater results secured in the use of bituminous coal and its being more easily procured, the United States Navy, in 1883, made a change from anthracite to soft coal, and if there was some method by which the smoke producing qualities could be eliminated bituminous coal would make an ideal fuel, not only for Navy purposes, but other commercial purposes. Smoke consumers have been generally unsuccessful and the smoke produced in furnaces cannot be consumed so as to be made invisible. Skilled firing will do more to prevent smoke in the furnaces, and upon this, whether through the use of automatic stokers or otherwise, we should depend for success in meeting the smoke producing qualities of soft coal.

NATURAL GAS

And Its Future

Natural gas is disappearing rapidly from the many fields. It is easily to be seen that the large industrial development will be, as they are in the main at present, in close proximity to where large fuel deposits exist. Great Britain would lose her large industries if not for her coal deposits. There is much alarm felt over the rapid depletion of same, and prominent interests are opposing the exporting of coal. As it is, they have to mine it under adverse conditions in the way of deep shafts and expensive mining.

We lead the world and our wealth of fuel is in the main what has aided us. The absence of so fortunate a supply of coal would show quite a different industrial condition in the Pittsburgh district. Modern methods in advancement, in construction and development, require more iron and steel, and with the rapid disappearance of wood as structural material there will be a marked increase in the use of metal for construction.

EXPORT COAL

Our vessels that have to coal in Europe are compelled to pay $2.50 to $3.50 more per ton for coal on that side than here. This is because the main available coal areas of Europe are becoming rapidly depleted and the prices are soaring. The result is that vessels sailing from this side, whether American or foreign, desire to carry as much coal as possible to supply them until their return.

There are large coal areas in Europe and Asia and other parts of the globe, but it is not a question as to the amount, but as to its availability. A few hundred miles over poor lines of railroad or none at all will make inaccessible for consumption such coal beds, regardless of their purity.

In the bids supplying the Belgium government with coal in March, 1907, the price asked for bituminous coal was $3.28 to $4.44 per ton; hard coal No. 2, $2.90 per ton; half bituminous, No. 3, $3.09 per ton, and coke, $6.17 per ton. You can note the efficiency of bituminous coal from that of hard coal.

As to our market, will say, that with the underlying conditions as they are, the large coal market at home, the coal trade has a flattering outlook when you consider the great field for export trade. We can put our coal on boats at Newport News, Norfolk, Philadelphia, Baltimore or New York, or any nearby port, and ship it to Europe and sell it for less money than coal can be bought for in European markets.

An aggressive and extensive movement could be made on the part of American capital in the way of shipping coal to Great Britain and the rest of Europe. In the last few years some of our capitalists have suddenly awakened to this great commercial opportunity. This would enlarge our capacity and meet not only all needs of our thousand of consumers here but give them the coal at a price that would aid industrial conditions there.

The mines in Belgium are stated to be somewhat like the anthracite district; they have passed the limit of their capacity for the production of coal. In Germany there is embarrassment among manufacturers because of the high price and scarcity of fuel due to exhaustion of their mines and the curtailment of the export of coal from Great Britain. Great Britain's product is limited and price high because of the increased expense of securing production. Many shipments of coal from our Eastern ports are made to London. By having the carrying capacity we can sell coal at a good profit and at rates low enough to command an excellent export trade. When American capital is certain that the ocean rates will not be made arbitrary and the carrying capacity being large to suit requirements, then will we invade in earnest the coal markets of Europe. It is simply a question of ocean transportation, and this should certainly soon be solved.

The reason that there is but little export trade is thus explained. We have the coal and there is an immense demand for it abroad, yet we have not been able to sell it cheaply enough because of the high charges in transportation. This question should very soon resolve itself into some fair and definite form.

The mines of Great Britain to-day supply the greater part of the demands for coal throughout Europe. English and Welsh coal is found in every part of the world where steamboats refill their bunkers; every Naval Station on the globe, except those where the American flag is to be seen, have British coal on their docks. English economists are raising the cry against exporting of coal. They see in the dim future that England will be stripped of her fuel supply, and with this her industrial glory will begin to wane.

We can mine our coal far more cheaply than can the English. Our seams are, in the main, in horizontal beds and lay near the surface. With modern machinery we get a great output and we can produce the best fuel known to commerce. Far sighted economists will observe that we have export trade of wonderful proportions before us; we need it for iorn and steel as well and will get it. The exports of coal from the United States have never exceeded 8,000,000 tons in any one year, but in 1906 is about fourteen times as much as 1886 on bituminous coal, while for the same period in anthracite coal it is only about three times, and for the past ten years in coke the domestic exports can be multiplied seven times. With coal at New Castle, England, and Cardiff, Wales, at from $5.50 to $7.00 per ton, we can export coal to Continental Europe at a profit, even with present freight rates. The ocean shipping facilities must be improved, and this would be the initial step toward organizing a large export trade. Shippers should own their own specially constructed colliers. By shipping coal by water the entire distance from Pittsburgh, our Pittsburgh coal could be sold more cheaply at Cardiff, Wales, than the Welsh coal can be produced there.

Our United States consul, at Havre, states that owing to the widespread scarcity of coal at times the large French consumers of coal are investigating the question of future use of American coal. Also at many other consular points. Once a foothold is obtained, American ingenuity and tenacity of purpose would make our export trade in coal a permanent one, and it would be of great value to our shippers and miners and would assume large proportions.

INDUSTRIAL SITUATION

In no other country in the world is property so secure and wealth better protected than in the United States. Not until the 5th (Fifth) Amendment of the Constitution had been repealed could there be an uprising against wealth to the extent of confiscation of private property.

Then again, we are a commercial nation—a commercial people. Every person desires to keep intact his personal holdings, however small they be. Publicity in methods and results is all our democratic people demand, and that given, we will continue our great industrial progress.

To observe the rapid recovery from business depression in this country look at statistics of Pig Iron production. From 1883-85 there was decrease in production of tin amounting to 11% followed by gain of 40% from 1885 to 1886. From 1903 to 1904 there was a decline of 9.3% in production of pig iron followed by a gain from 1904 to 1905 of 40%, exactly the same proportion as from 1885 to 1886. The same large continued increase in coal and coke production.

The extent of depression is never equal to public estimate of it. Government estimate given for few years show conclusively that the volume of production, in what we call hard times, was only from 6 to 8% less than in good times; and it is clearly shown by the most authoritative statistics that the running time of all industries, taken as a whole, is sometimes longer during period of depression than in prosperous times; at least it does not vary from 290 days in a year whether times are good or bad. So far as number of persons employed are concerned the same may be said, that the number does not vary largely whether times are good or bad.

There is nothing in records of trade, transportation and banking during the past 50 years to indicate any tendency toward a secondary reaction between these ten year periods.

At the present time we are experiencing a political upheaval—but business and trade have not checked. Before presidential elections we experience slight check, but prosperity continues with the usual onward movement soon thereafter.

COAL RESERVES

Many estimates have been made as to how long coal reserves will last, and usually they are very wide in their ideas. They base their estimate on present output, but do not take into consideration that we produce now double what we did ten years ago and four times what we did twenty years ago. This multiplying of production shows quite a different result from a straight estimate on present output.

Asia's coal supply, the extent of Europe's supply, Colorado's and Montana's coal fields, have but little or nothing to do in figuring what the future value of our coking coal will be, and at the same time how long will it last. The prediction is well made that with present increase it is quite probable that in much less than twenty years from now we will see eastern Greene and eastern Washington counties having the largest operations in coke, and at the same time realize the extent of our rapidly disappearing coal reserves.

Quoting Mr. John H. Jones:

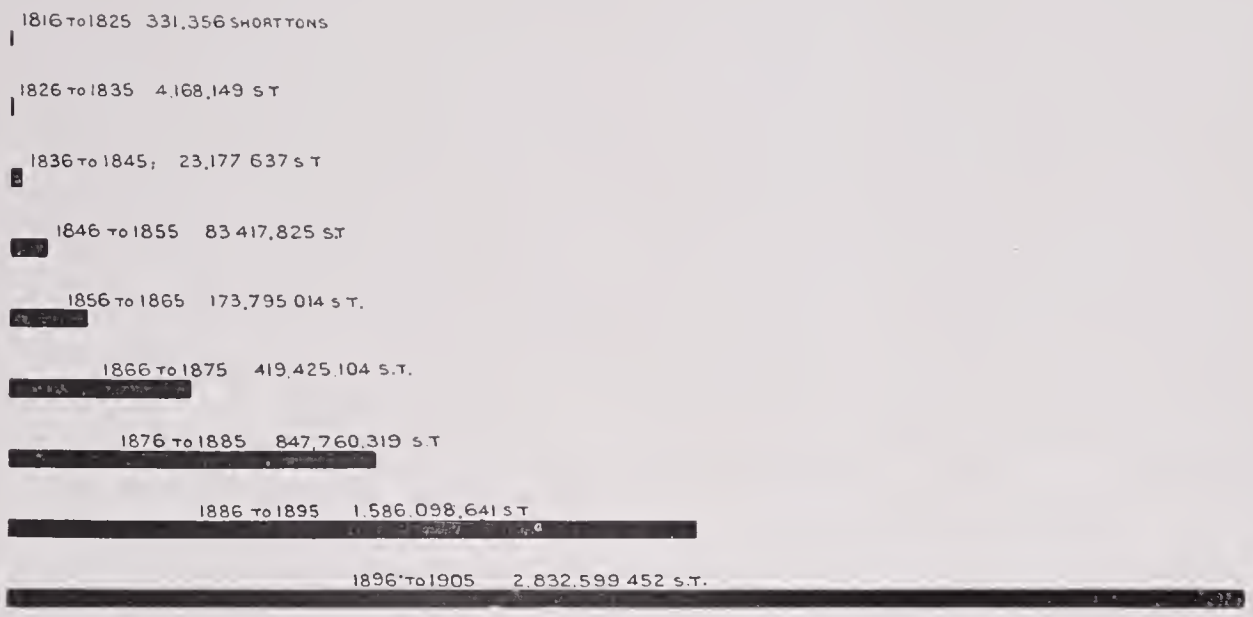
"The anthracite production in the State of Pennsylvania in 1880 was 28,000,000 tons, while its production of bituminous coal was only 18,000,000 tons. Ten years later our production of anthracite was 46,000,000 tons, and the bituminous output 42,000,000 tons, or only 4,000,000 tons below the output of anthracite. In 1900 our anthracite product was 57,000,000 tons and the bituminous 80,000,000 tons, showing a difference of 23,000,000 tons in favor of the soft coal production.

At the present time Pennsylvania is producing at the rate of 75,000,000 tons of anthracite and over 100,000,000 tons of bituminous coal a year, while only nine years ago, or in 1897, the production of anthracite and bituminous in the State was equal, being something over 50,000,000 tons of each.

The production of the Pittsburg District for 1905 will amount to 42,000,000 tons. If the present ratio of increase continues, there will be mined in the Pittsburg District during the next twenty years 1,758,000,000 tons, which, figuring a yield of 7,000 tons per acre, will exhaust 251,143 acres of coal.

The production of the present time and this prophecy for the future serve to emphasize what has been, what is and what will be the keynote of the prosperity of the Pittsburg District. As one-half of the coal produced in this district is consumed in and around Pittsburg, the figures here given will furnish some idea of the magnitude of the industries of this great city. Such figures also lead us to stop and think of the exhaustion of our coal beds, which are generally accepted as being inexhaustible and equal to any demands we may make upon them."

The following diagram, prepared from statistics of coal production collected by Mr. E. W. Parker, of the United States Geological Survey, shows graphically the amount of coal produced in each decade since 1816. He says:



"Will our Coal last 100 years?

"The actual consumption of coal in the United States during this period has been somewhat greater than that shown by the diagram, for some coal has been imported, but the diagram shows the rate at which we have been using our own coal. The rate of increase is enormous; it is simply appalling. As shown by the diagram, the amount produced in any one decade is equal to the entire previous production. The curve indicating the increase seems to be going off into the future in a straight line, and this means an increased production that no supply, however great, can withstand for many years.

If the rate of consumption of 1905 were maintained indefinitely, without change, our coal would last approximately 4,000 years, but if the constantly increasing rate which has marked the consumption during the past 90 years be maintained, our coal will practically be exhausted within 100 years.

The question now remains, Will this increasing rate hold? In order to answer that question we must analyze the present consumption to see whether all of the factors composing it will probably continue to increase in the future as they have done in the past.

A large part of the coal produced in this country is consumed by the railroads. According to an estimate prepared by the Interstate Commerce Commission, the amount of coal consumed by locomotives in 1905 amounted to 106,000,000 tons. Will this increase or decrease in the future? While it is possible that railroad building in the future will not be so active as it has been in the past, there is every prospect of a great and growing increase in the traffic of existing lines, and this will lead to a constantly increasing consumption of coal unless some new source of power is discovered. The same argument applies to steamship lines, to manufacturing, and to domestic consumption of coal. In view of these considerations, it does not seem probable that the rate of increased consumption will be affected materially for a great many years to come, and hence the estimate of 100 years will be nearer the truth than 4,000 years. The real life of our coal fields probably will be somewhere between these extremes, and it seems probable that it may be about 200 years.

If this estimate is even approximately correct, is it not time for the government to take some steps to prevent the remaining coal of the west from passing to the hands of corporations, to prevent wasteful methods of mining and use, and to conserve for the use of the common people even this small fraction of the total coal of the country? No doubt there is a great difference of opinion on this subject, but it is hard to see how any fair minded person interested in the good of the people of this country rather than the corporations can look upon the present situation with other than concern, and can fail to unite in an effort to avert the evil consequences that may be in store for future generations."

The following eleven pages embrace a folio prepared by H. A. Kuhn, President of Pittsburgh-Westmoreland Coal Company, one of the larger Companies in Pittsburgh District; the values shown therein are brought up to date.

Mr. H. A. Kuhn is a Mining Engineer of wide experience and is a recognized authority on Pittsburgh coal and the coal mining industry.

Pittsburgh coal field showing area of coking coal area of gas coal, area of high grade steam coal.

Also graphic representation showing yearly productions to date, probable future yearly productions, probable life of Pittsburgh coal field.

Values of the coking coal, gas coal and steam coal of the Pittsburgh field during the last six years, probable increase in values during the next ten years.

Also ownership of coal lands and divisions of field, showing location of steam coal, coking coal and gas coal.

IRON AND STEEL INDUSTRY

The iron and steel industry of Pittsburgh and Lake districts nearby, the most wonderful developments in history, was possible because of the existence of the

LAKE SUPERIOR IRON ORES

and

THE PITTSBURGH COAL FIELDS.

The largest industrial centre of the world has been built on the use of these two materials in the Pittsburgh district.

THE LAKE SUPERIOR IRON ORES, once thought to be inexhaustible, have now a certain measured quality and value; that value is certain, safe and rapidly increasing.

THE PITTSBURGH COAL FIELDS possess the same advantage over all other coal fields as the LAKE SUPERIOR IRON ORES over other iron ores, and the foundation upon which the values rest are the same for both.

1st, LOCATION. THE PITTSBURGH COAL FIELD surrounds and is nearest the largest iron and steel manufacturers of the world. It is 160 miles to a Lake front. It is the only low sulphur coking and gas coal that can meet the LAKE SUPERIOR IRON ORES at a low transportation cost.

2nd, QUALITY. The quality of the Pittsburgh coal area as shown on the map, cannot be approached by any other coal. For coking, chemically, the coke is uniformly low in sulphur, phosphorus and ash; physically, no other coke has hardness of body, cell structure and burden bearing qualities equal to the coke made from the Pittsburgh seam. For gas making, the Pittsburgh gas coal is the finest in the world, and to-day practically all the gas plants east of the Mississippi River use Pittsburgh gas coal, which yields 10,000 feet of gas to the ton of coal of 18 candle power as well as the maximum quantities of by-products.

When used to generate steam it is only equalled by the Pocahontas coal. In competition with ordinary steam coal, it generates 10 per cent. more steam, hence, where a delivered cost is $2.00 to $3.00 per ton, Pittsburgh coal is worth 25 cents more per ton to the consumer than a competing coal at the same price, and in addition the engineer and firemen are satisfied.

3rd, COST OF PRODUCTION. On account of this thickness and uniformly horizontal position of the seam a miner is able to work in a standing position, and can produce a maximum tonnage of coal for a good day's wages. This seam of coal is especially adapted to mining machinery; practically all coal is produced by machine mining.

OWNERSHIP OF COAL

The Pittsburgh coal field of the quality which made the development of the iron industry possible, is to-day held by a few corporations and individuals.

QUANTITY AND LIFE OF FIELD

The quantity is now measured and the life of the unmined area ascertained. It is now known that a production meeting the maximum requirements cannot be maintained for a period of more than fifteen years of gas coal, and thirty-five years for coking coal. The area of the Lake shipping and steam coal, which exceeds in quality 90 per cent. of all other eastern coals, will be depleted as rapidly as the gas and coking coal.

VALUES

Values of the Pittsburgh coal field of the quality as mapped, has increased almost as rapidly as the LAKE SUPERIOR IRON ORE. The values and appreciation in values are equally as certain. A conservative estimate of increase in value for the whole field can be placed at 10 per cent. a year for the next ten years. Few other investments are as safe. The increase is certain, and the coal, while underground, is indestructible.

MAPS AND TABULATED INFORMATION

The following maps and tabulated information show the area of coking coal, area of gas coal, and area of high grade steam coal;

Also graphic representation showing yearly production to date;

Probable future yearly production;

Probable life of the Pittsburgh coal field.

VALUES

Values of the coking coal, gas coal and steam coal of the Pittsburgh field during the last six years;

Probable increase in value during the next ten years;

Also ownership of coal lands.

MAP OF PITTSBURG COAL FIELD
Showing
General Location and Outline OF Coal Lands Ownership

ALLEGHENY

PITTSBURGH

124 Miles to Lake Front by rail

BRADDOCK

CARNEGIE

HOMESTEAD

McKEESPORT

CLAIRTON

ELIZABETH

MONONGAHELA

CHARLEROI

FAYETTE CITY

WEST NEWTON

GREENSBURG

LAYTON

CONNELLSVILLE

UNIONTOWN

WAYNESBURG

WASHINGTON

GREENE

FAYETTE

WESTMORELAND

BASIN

Carnegie Coal Co.

P.C.C. & St. R.R.

U.S. Steel Co.

Pittsburgh Coal Co.

M.R.C.C. & C. Co.

10 Miles

Pittsburgh Coal Co. Carnegie Coal Co.

United Coal Co.

Washington Blk. Co.

Patterson

B. & O. R.R.

P. & W.

Lackawanna Steel Co.

Pgh. & Westmoreland

Mon. River C.C. & C. Co.

James & Laughlin Steel Co.

Pittsburgh & Buffalo Co.

M. & W. R.R.

30 Miles

Ten Mile Village

J.V. Thompson

40 Miles

Patterson

P.B. Co.

Klondike Connellsville Coke & Coal Co.

1/8 Mined Out

U.S. Steel Co.

12-Coke Companies

Bessemer Coke Co.

S. Connellsville Coke Co.

Blame Coal Co.

P.B.L.E.R.R.

P.C. Co.

Westmoreland Coal Co.

Irwin

Ocean Coal Co.

P.R.R.

Keystone C. & C. Co.

Pittsburgh & Westmoreland

Westmoreland

Patterson

2/3 Mined Out

1/2 Mined Out

Washington C. & C. Co.

This indicates the penetration of mining operations to date. A greater part of the land shown thus is exhausted

MAP OF
PITTSBURG COAL FIELD
Showing
Acres of Unmined
GAS COAL
COKING COAL
PANHANDLE STEAM COAL
1907-B

ALLEGHENY

PITTSBURGH

BRADDOCK

HOMESTEAD

McKEESPORT

CARNEGIE

P.C.C.&St.L.R.R.

PANHANDLE COAL

90,000 Acres Unmined Coal

PITTSBURG PANHANDLE COAL AND LAKE SHIPMENT

60,000 Acres Unmined coal

CLAIRTON

P.B.&C.R.R.

ELIZABETH

B A S I N

IRWIN
25,000 Acres
Unmined Gas Coal

10,000 A. Unmined Gas Coal

WEST NEWTON

5,000 Acres Unmined Coal

STEAM Mined Out 2/3 MAKES COKE WHEN WASHED

P.R.R.

GREENSBURG

2/3 Mined Out

MAKES SECOND GRADE COKE

WESTMORELAND

HIGH GRADE PITTSBURG COAL USED FOR STEAM AND GAS

HIGH GRADE GAS COAL CHANGING TO HIGH GRADE STEAM COAL

WASHINGTON

60,000 Acres

MONONGAHELA

B&O R.R.

MAKES STANDARD COKE

COKING COAL

30,000 Acres Unmined Coal

30 MILES

M.&W.R.R.

GAS

HIGH GRADE GAS COAL

90,000 Acres Unmined Gas Coal

MAKES STANDARD COKE

CHARLEROI

USED FOR STEAM

12,000 Acres

Unmined Coal

LAYTON

FAYETTE CITY

MAKES STANDARD COKE

COKING COAL

MAKES STANDARD COKE

CONNELLSVILLE BASIN

1/2 Mined Out

Unmined Coal

STANDARD CONNELLSVILLE COKE

CONNELLSVILLE

BROWNSVILLE

TEN MILE VILLAGE

KLONDIKE CONNELLSVILLE Coking Coal

MAKES STANDARD COKE

1/8 Mined out

40,000 Acres Unmined Coal

FAYETTE

1/2 Mined out

10,000 Acres

MAKES ORIGINAL

UNIONTOWN

GREENE

Coking Coal

150,000 Acres

90 Miles

WAYNESBURG

HIGH SULPHUR LOW GRADE COKE
HIGH ASH " " "

Line North and South through Butler

80

MAP OF PITTSBURG COAL FIELD

Showing

FOR EACH DIVISION OF THE FIELD

Present Values of Coal Lands

Approx. Yield in Tons per Acre

" *in Feet of Gas per Ton*

" *in British Ther. Heat Units*

Percentage of Sulphur

" *Ash*

1907-B

ALLEGHENY

PITTSBURGH

BRADDOCK

HOMESTEAD

CARNEGIE

McKEESPORT

IRWIN

GREENSBURG

WESTMORELAND

WASHINGTON

MONONGAHELA

WEST NEWTON

LAYTON

DAWSON

FAYETTE CITY

CONNELLSVILLE

CONNELLSVILLE BASIN

BROWNSVILLE

FAYETTE

GREENE

WAYNESBURG

UNIONTOWN

ELIZABETH

10 Miles Acre

20 Miles

30 Miles

40 Miles

$300 Per Acre

6500 TONS TO ONE ACRE
13500 HEAT UNITS TO ONE TON
1¾ to 2% SULPHUR
7% ASH

$500 Per Acre

$400 Per Acre

$500 Per Acre

$600 Per Acre

6700 TONS TO ONE ACRE
13600 HEAT UNITS TO ONE TON
1¼% SULPHUR
7% ASH

$500 Per Acre

6800 TONS to ONE ACRE
13700 HEAT UNITS to ONE TON
1¼% SULPHUR
6½% ASH

$500 Per Acre

$800 Per Acre

7000 TONS to ONE ACRE
14000 HEAT UNITS to ONE TON
1¼% SULPHUR
6½% ASH

$1000 Per Acre

7000 TONS to ONE ACRE
14000 HEAT UNITS to ONE TON
1¼% SULPHUR
6% ASH

$1000 Per Acre

7500 TONS to ONE ACRE
14200 HEAT UNITS to ONE TON
1% SULPHUR
6% ASH

$1000 Per Acre

1000 FEET GAS to ONE TON
8000 TONS to ONE ACRE
14500 HEAT UNITS to ONE TON
0.8% SULPHUR
5% ASH

$1200 Per Acre

3500 TONS to ONE ACRE
1000 FEET GAS to ONE TON
1% SULPHUR

14200 BRITISH THERMAL HEAT UNITS to ONE TON
IRWIN 0.8% SULPHUR 6% ASH

$1200 Per Acre

8500 TONS to ONE ACRE
10000 FEET OF GAS to ONE TON
1¼% SULPHUR 6½% ASH

$1200 Per Acre

13800 HEAT UNITS to ONE TON
1½% SULPHUR
6½% ASH

$1100 Per Acre

1¼% SULPHUR
6½% ASH

$300 Per Acre

$500 Per Acre

14500 HEAT UNITS to ONE T.
3500 TONS to ONE ACRE
1000 FEET GAS to ONE TON
0.8% SULPHUR
5% ASH

$1200 Per Acre

14500 HEAT UNITS to ONE T.
3500 TONS to ONE ACRE
1000 FEET GAS to ONE TON
0.8% SULPHUR
5% ASH

$1200 Per Acre

14200 HEAT UNITS to ONE TON
1000 FEET GAS to ONE TON
0.9% SULPHUR

$1200 Per Acre

6000 TONS to ONE ACRE
12000 HEAT UNITS to ONE TON
1½% SULPHUR
6% ASH

$1500 Per Acre

$1200 Per Acre

7% SULPHUR
6% ASH
10000 TONS ONE ACRE

$800 Per Acre

$800 Per Acre

6% ASH
0.9% SULPHUR

$1600 Per Acre

$2000 Per Acre

10000 TONS TO ONE ACRE
0.8% SULPHUR
6% ASH

$1200 Per Acre

1½% SULPHUR

$2100 Per Acre

$3000 Per Acre

10000 TONS ¼ ONE ACRE
0.75% SULPHUR
6% ASH

MAP OF PITTSBURG COAL FIELD

SHOWING

Established mining rates and costs of the different sections of the Coal Field. The lower cost south of the established dividing line is due to the thickness of the coal seam - enabling the miner to earn as much money in a day at the lower mining rate as the miner north of this line working at a higher mining rate Non-Union labor is paid on the basis of the lower mining rate except Westmoreland Gas Coal District.

● Indicates Mining Operations.

1907-B

ALLEGHENY

ALLEGHENY

PITTSBURGH

BRADDOCK

HOMESTEAD

CARNEGIE

P.C.C. & St. L. R.R.

McKEESPORT

IRWIN

High Mining Cost
Low Freight Rate

10 MILES

Non Union Labor

Non Union Labor

GREENSBURG

CLAIRTON

ELIZABETH

WEST NEWTON

WASHINGTON

WASHINGTON

High Mining Cost
Low Freight Rate

MONONGAHELA

COAL SOUTH OF THIS LINE IS MINED FOR $ 1000.00 PER ACRE LESS THAN COAL NORTH OF LINE

CHARLEROI

Low Mining Cost
Low Freight Rate

FAYETTE CITY

LAYTON

WESTMORELAND

Laborland

BASIN REGION

30 MILES

CONNELLSVILLE

TEN MILE VILLAGE

BROWNSVILLE

High Freight Rate
Low Mining Cost

Low Mining Cost
High Freight Rate
Non Union Labor

FAYETTE

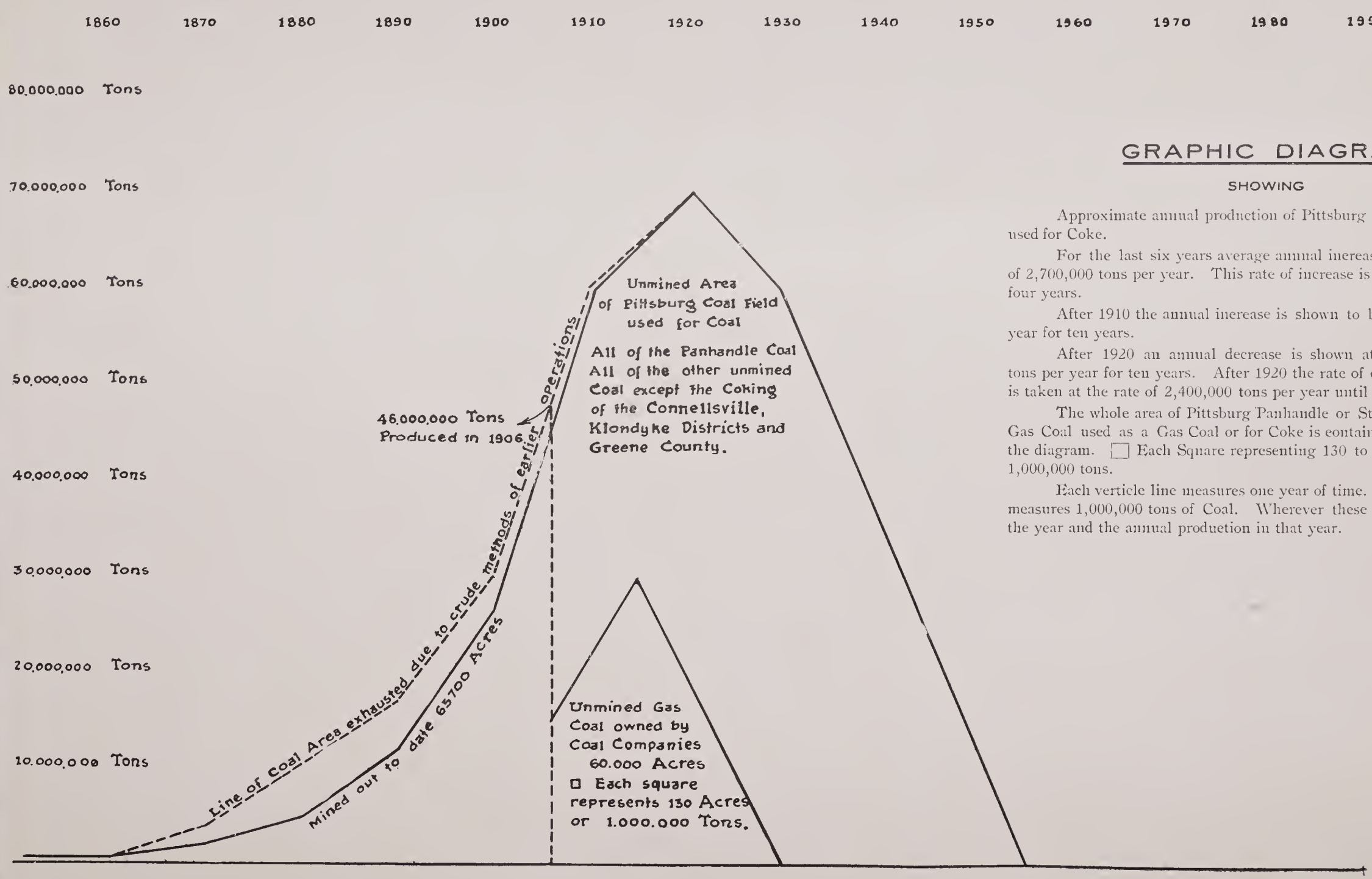
Non Union Labor

GREENE

40 MILES

WAYNESBURG

UNION TOWN



GRAPHIC DIAGRAM

SHOWING

Approximate annual production of Pittsburg Coal Field of Coal not used for Coke.

For the last six years average annual increase has been at the rate of 2,700,000 tons per year. This rate of increase is shown to continue for four years.

After 1910 the annual increase is shown to be 1,000,000 tons per year for ten years.

After 1920 an annual decrease is shown at the rate of 1,000,000 tons per year for ten years. After 1920 the rate of decrease in production is taken at the rate of 2,400,000 tons per year until all coal is exhausted.

The whole area of Pittsburg Panhandle or Steam Coal—all of the Gas Coal used as a Gas Coal or for Coke is contained within the lines of the diagram. □ Each Square representing 130 to 140 acres of Coal or 1,000,000 tons.

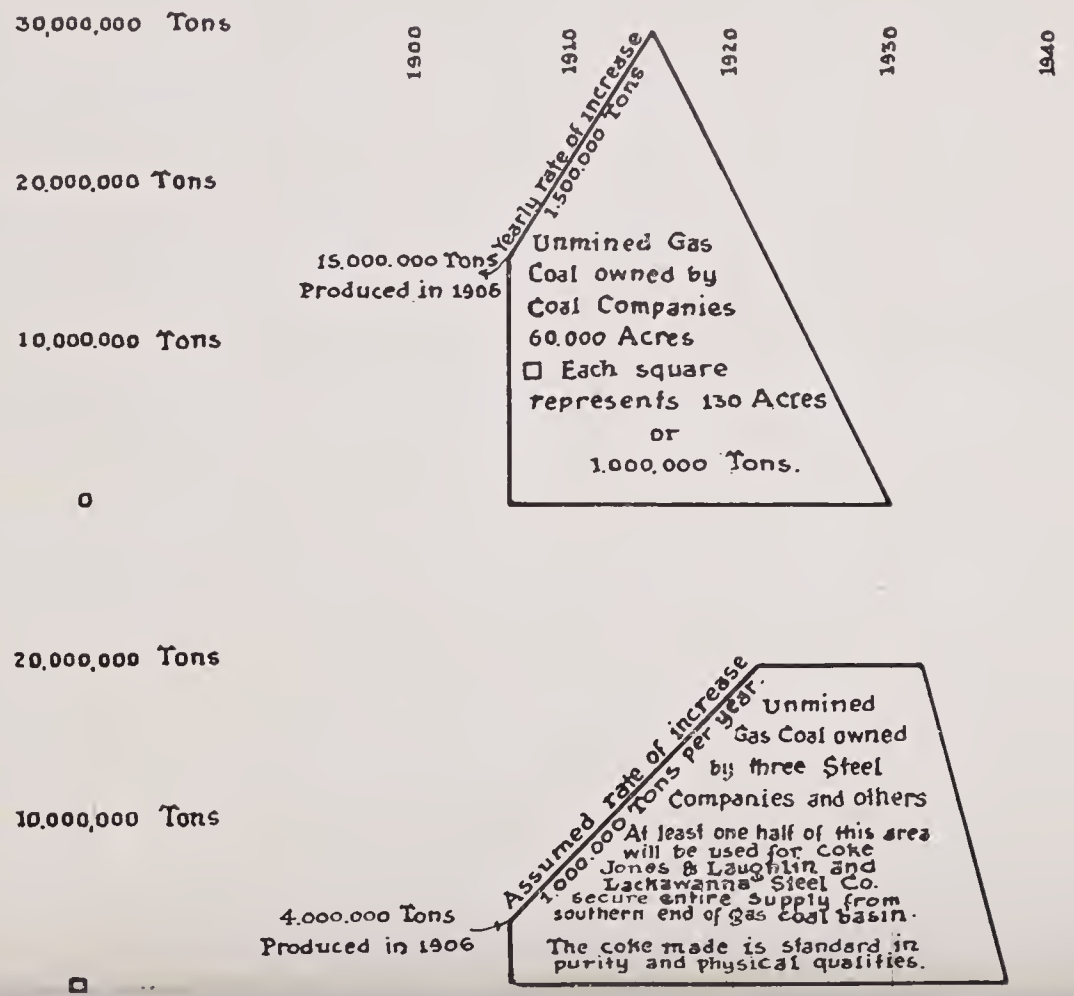
Each verticle line measures one year of time. Each horizontal line measures 1,000,000 tons of Coal. Wherever these lines intersect shows the year and the annual produetion in that year.

Average Values of Gas Coal
1900 - $500 per Acre
1901 - $600 " "
1902 - $700 " "
1903 - $800 " "
1904 - $900 " "
1905 - $1000 " "
1906 - $1100 " "
1907 - $1200 " "
Probable increase in values due to lessening quantity of material with increased demand
1908 - $1300 per Acre
1909 - $1400 " "
1910 - $1500 " "
1911 - $1600 " "
1912 - $1700 " "
1913 - $1800 " "
1914 - $1900 " "
1915 - $2000 " "

125,000 Acres of Unmined Gas Coal.
□-Each square represents 130 Acres or 1,000,000 Tons

60,000 Acres of this Coal is owned by Coal Companies who supply the general demand and 65,000 Acres is owned by Steel Companies and others.

Note:- See diagrams below for division of this area.



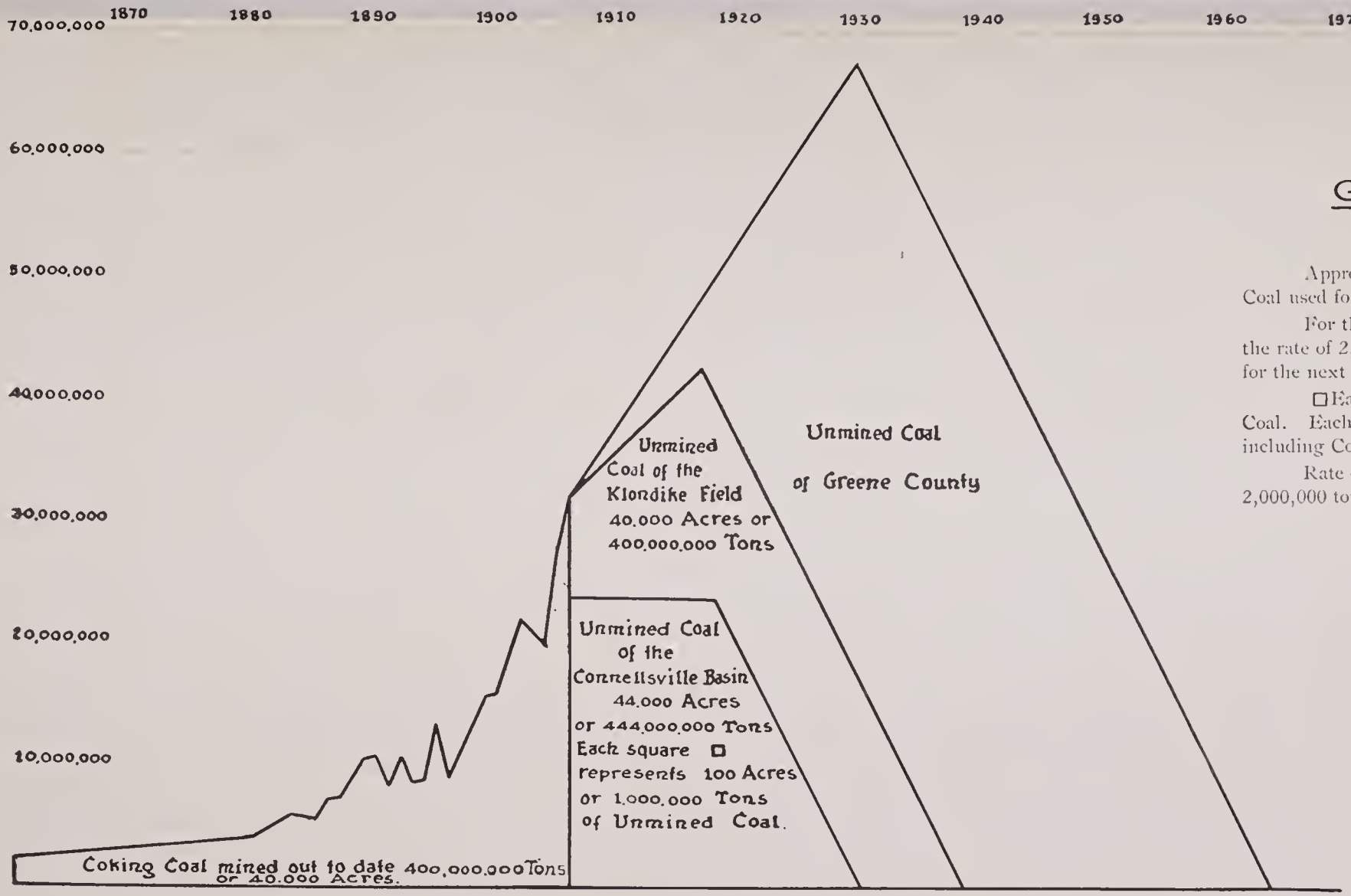
GRAPHIC DIAGRAM

SHOWING

WHOLE AREA OF UNMINED GAS COAL IN THE PITTSBURG COAL FIELD

This diagram shows that the market demand cannot be supplied by the Coal Companies longer than 10 or 12 years, after which time the mines will decrease in production rapidly to exhaustion of whole area.

This Basin of Coal yields 10,000 feet of gas, high candle power, to the ton of coal. As a Steam Coal it produces 14,500 Heat Units to one ton against 13,000 B. T. Heat Units produced by 90% of competitive coals. Where the price delivered is $3.00 to $4.00 per ton, this coal delivers 30 to 40 cents worth more of Heat Units than the ordinary competitive coal.



GRAPHIC DIAGRAM

SHOWING

Approximate annual production of Pittsburg Coal Field of Coal used for Coke including the Connellsville Basin.

For the last six years average annual increase has been at the rate of 2,400,000 tons per year. The rate of increase shown for the next twenty-four years is 1,500,000 tons per year.

□Each Square represents 100 acres or 1,000,000 tons of Coal. Each ton of Coke is assumed to require 1.6 tons of Coal, including Coal used for power at Coke Plant.

Rate of decrease to exhaustion of whole area is taken at. 2,000,000 tons of Coal each year.

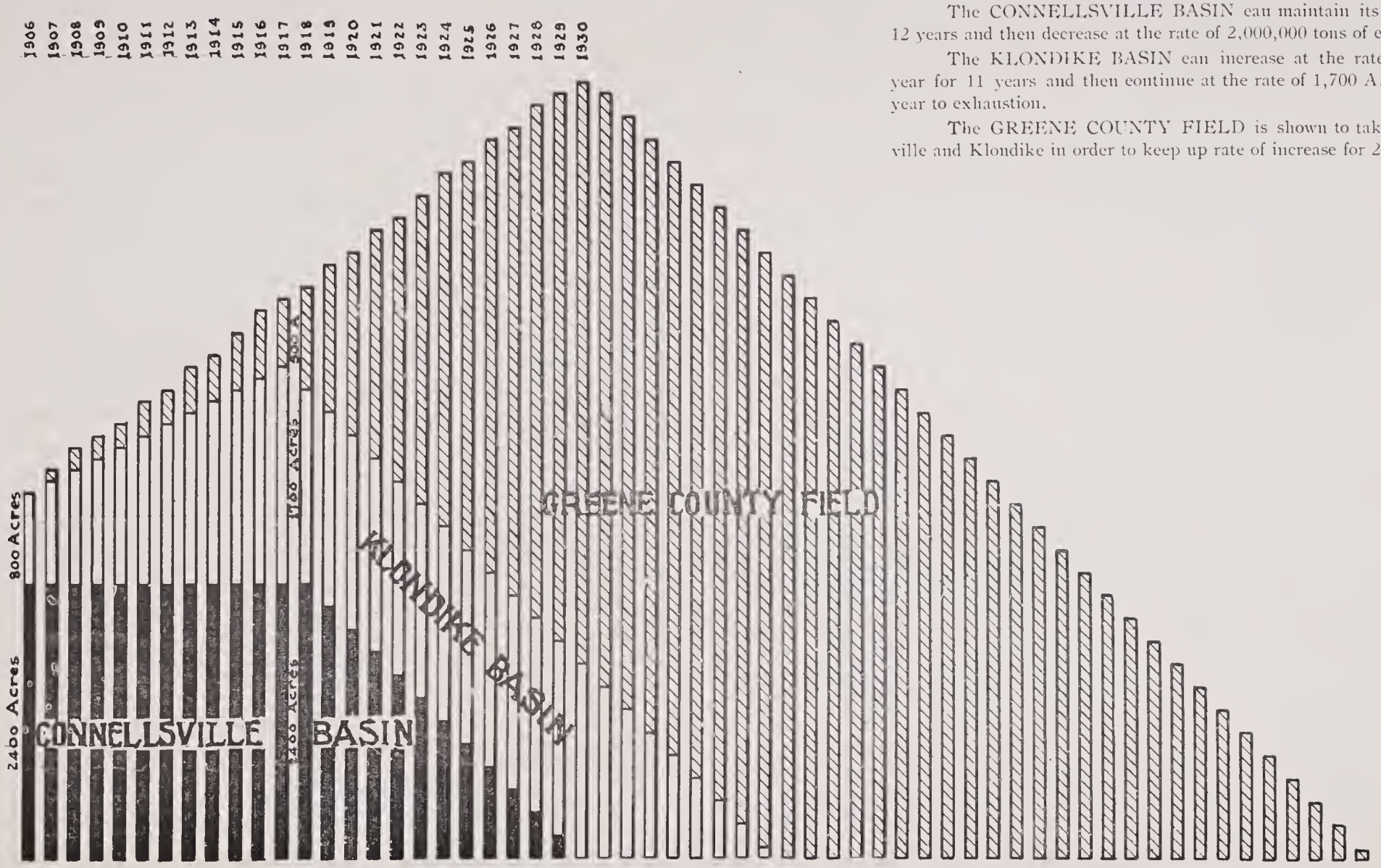
VALUES.

Increase in values of Coking Coal during last six years.

	Connellsville Field.	Klondike Field.
Value – 1900	$1000 per Acre	$400 per Acre
" – 1901	1100 " "	500 " "
" – 1902	1250 " "	600 " "
" – 1903	1400 " "	700 " "
" – 1904	1550 " "	800 " "
" – 1905	1700 " "	900 " "
" – 1906	1850 " "	1200 " "
" – 1907	2500 " "	1800 " "

The Connellsville Field will probably increase in value to $3500 per Acre during the next five or six years;

The Klondike Coal of good quality to $2500 per Acre or more in about the same time.



GRAPHIC DIAGRAM

SHOWING

Area of Coking Coal exhausted of the Pittsburg Seam, 1906.

ALSO area that will be exhausted each year of coking coal in order that the production may increase at the rate of 1,500,000 tons per year.

The CONNELLSVILLE BASIN can maintain its present production for 12 years and then decrease at the rate of 2,000,000 tons of coal per year

The KLONDIKE BASIN can increase at the rate of 1,000,000 tons per year for 11 years and then continue at the rate of 1,700 A. or 17,000,000 tons per year to exhaustion.

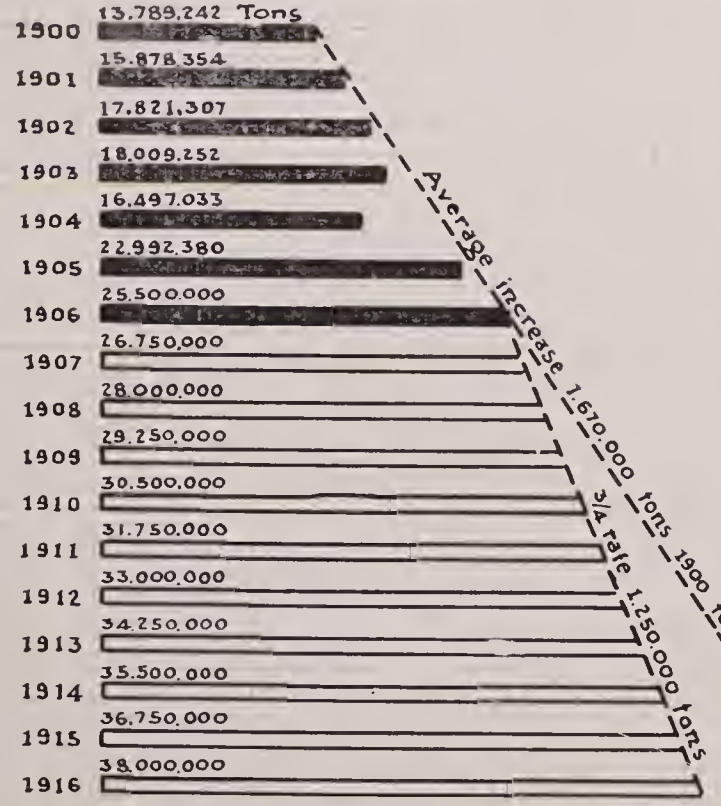
The GREENE COUNTY FIELD is shown to take the place of Connellsville and Klondike in order to keep up rate of increase for 20 years.

GRAPHIC DIAGRAM

WITH FIGURES

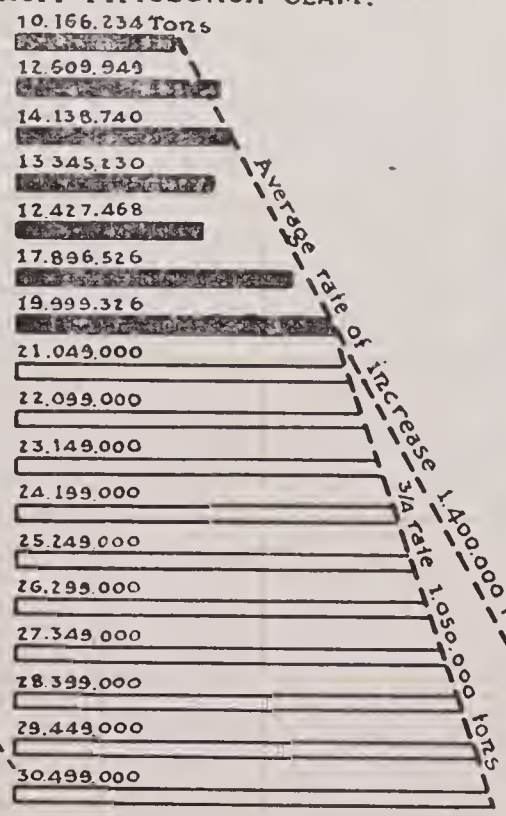
Showing for the Years 1900 to 1906 inclusive.
Total annual production of Pig Iron.
Annual production of Coke made from Pittsburg Coal Seam.
Total annual production of Coal of the United States.
Annual shipments of Coal on the Great Lakes.

ANNUAL PRODUCTION OF PIG IRON



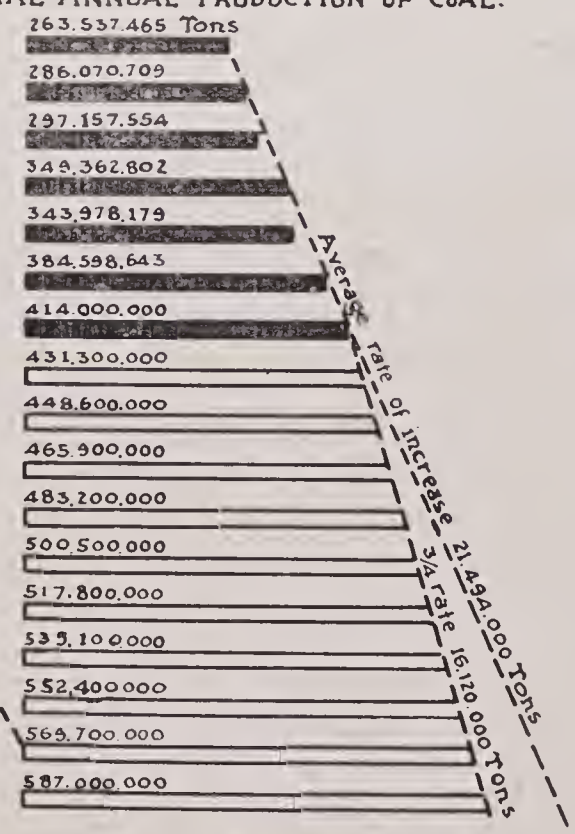
Average rate of increase in Pig Iron Production for seven years has been 1.670.000 tons per year Production from 1906 to 1916 is shown at an average rate of increase 25% less which would bring the Pig Iron Production of the United States in 1916 to 38.000.000 tons.

ANNUAL PRODUCTION OF COKE MADE FROM PITTSBURGH SEAM.



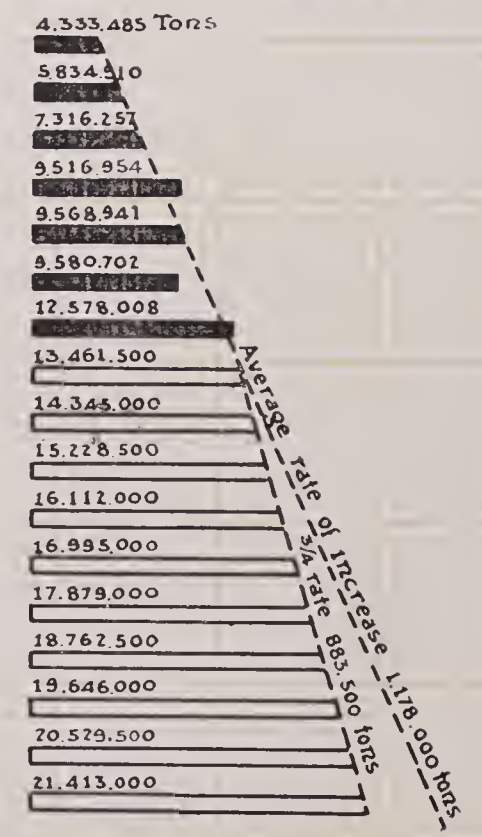
Average rate of increase in Coke Production from the Pittsburgh Seam has been 1.400.000 tons per year. Production from 1906 to 1916 is shown at an average rate of increase 25 % less

TOTAL ANNUAL PRODUCTION OF COAL.



Average rate of increase in Coal Production in the United States has been 21 494.000 Tons per year. Production from 1906 to 1916 is shown at an average rate of increase 25 % less.

LAKE SHIPMENT OF SOFT COAL



Average rate of increase in Lake Shipment of Soft Coal has been 1.178.000 Tons per year. Shipment from 1906 to 1916 is shown at an average rate of increase 25% less.

IRON AND STEEL

The statistics relative to the production of steel in the United States, as given by the American Iron and Steel Association, shows a production of Open Hearth Steel, Ingots and Castings, for 1905 and 1906, in the United States:

1905..... 8,971,376 gross tons
1906..... 10,970,998 gross tons

With the outlook ahead in iron and steel as it is, just as certain as our industrial progress goes forward, will we need a steady and increasing supply of these commodities.

The building of a large steel plant at Duluth, and of a $75,000,000 plant at Gary, Indiana, certainly show the faith our large interests have in the future of the iron and steel business. Pennsylvania's furnaces make more than one-half of the output of pig iron in the United States.

EXHAUSTING NATURE'S CAPITAL

The proceeds from the mining of coal is real and permanent wealth, as they are values taken from the earth. In developing a mining proposition no one is the loser, no one is wronged, even if the owners do become wealthy. Values are created.

The worth of our coal production last year amounted to several hundred million dollars. With the tremendous advantage in the development of the natural resources of this country, our coal bills will increase every year, and it would require a vivid imagination to estimate its limits in the next two or three decades. Therefore, we see that coal belongs to the limited and rapidly disappearing reserve force of nature. In the consuming of coal we are making inroads into Nature's capital. Various estimates have been made as to how long the existing deposits will withstand the increasing draft made on them, and exceptional interest should be taken in this. Under the present conditions, the tendency of coal prices is upward, and coal must always be relatively costly, by reason of remoteness from production. The advantageons location of the coal operation means much.

As to the present and future state of coal trade, the marvelous growth of our industrial systems of late years has created large and continually increasing demands for bituminous coal for fuel by manufacturers, gas producers, transportation companies, power plants, and numerous other industries.

The foundation of all these industries and the force and power which moves the wheels of commerce is found in the lump of coal, which goes into the furnace and releases the stored up energy. Coal is, therefore, the fundamental basis of power, and it is the staple article which of necessity finds use and ready sale in every state in the Union.

COAL—GENERAL

Coal is universally used as a fuel. It seems that when nature prepared the earth for this strenuous advance of civilization, and at the time when geological formations were undergoing many changes, the greatest boon to mankind was being prepared for. Vegetation was quite luxurious in its growth. The carbonic acid gas generated was the main aid, and the result of the whole was beds of fuel buried deep in the bowels of the earth; some of them caused by more quiet subsidence and others left after much agitation; the one in the regular horizontal bed, the other with its trend of bed pointing skyward, and in both the magical power of combustion and ignition is to be had.

This country is first among the nations of the world in the production of coal, and it is naturally as well as true that greater opportunities are afforded here in the coal industry than any other country, and no field offers better results in investigation than that of the coal in-

dustry. The output of the world last year was more than 1,000,000,000 net tons. Of this the United States produced more than 400,000,000 tons. Bituminous coal forms the greater tonnage as compared with anthracite, and the territory producing it covers a much wider field; Pennsylvania taking the lead, followed by West Virginia, whose Pocahontas-New River-Kanawha famous districts are yielding large tonnages. Other districts increasing in tonnage are Alabama, Tennessee, Kentucky, Indian Territory; while Ohio, Indiana and Illinois trade has been on the increase for several years; while in the west and northwest Montana, Wyoming, Colorado, New Mexico and Utah have had a great increase in product. There is a large acreage of coal in the last five named States, especially in Colorado, but the long freight haul and being far from a large market, make the lands of but little value for immediate use.

There are many theorists who from time to time advance many arguments as to curbing the coal consumption through some device or invention, such as the Altoona man who burned two-third ashes and one part of coal and got better results than all coal; and various other parties advancing the conversion of peat balls and by making briquettes of coal; solving the coal problem by doing without coal; but the component parts and material energy that makes up such fuel has to come from some source or another, and invariably we find the coal the cheapest of any. The peat beds are restricted in their extent, and this alone will measure any argument that it would displace coal any other than locally.

Colorado's coal fields are great in extent. Much of the coal is superior in quality, free from sulphur and rich in carbon. A number of veins contain a species of coal which can readily be converted into coke.

COAL IN THE UNITED STATES

The United States is producing one-third more coal than Great Britain. Germany is following closely to Great Britain's output. Of the United States, Pennsylvania produces about three times as much bituminous coal as West Virginia or Illinois, which stand second and third respectively as coal producers. It is remarkable how rapidly the increase in consumption of coal has been in the past few years due to the vast number of enterprises projected by the most energetic people,—the railways, steamship companies, and the steel and iron interests, and the many others.

Since 1846, or sixty years, coal consumption has practically doubled every ten years. Because of the alarming diminishing of our coal resources, the United States Geological Survey has taken up the matter of obtaining the energy that might be taken from our poorer coals, such as lignites and other veins having high ash and other impurities.

The rate of increased demand for coal is not only enormous, but simply appalling. Higher speed is demanded on train and ship; forced output in our industries; it will be years before our railroads are able to properly take care of our developments, whether it be farm product or product from mill and factory.

In the past not nearly so much consideration has been given the purity of coal as at present. A fraction of sulphur or high ash very seldom made much difference in the price paid for the product.

Lately much consideration is being given to the purchase of coal rated on the heat unit value of same. The Commissioners of the District of Columbia, at Washington, have decided upon this basis. It is also stated to be the general plan of the Government to make future purchases of coal on the basis of heat producing value and not so much per ton. The better the quality the larger the price paid. A standard heat unit basis should soon be arrived at among the various coals used. This plan will soon go into operation, and the old basis, of so much per ton, will gradually disappear.

THE COUNTRY'S MATERIAL ENERGY

In contrasting, it is difficult to conceive of any relation between the forest of mammoth trees and luxurious vegetation which existed thousands of years ago, and the black substance outcropping on the hillsides. The two ends of this immeasurable span of time sums up the story of coal. First, the accumulation of vegetable matter from these forests,—leaves, bark, fibers, form into peat beds; then these, subject to the ever increasing pressure of accumulating strata above them, acted upon by heat and the chemical agencies of the earth in a manner to deprive the mass of certain gases, while retaining others, until in slow process the whole forest became compressed into what is known as coal. Nature has distributed her store of coal impartially, in such a way that most countries have some share.

Late science has brought forth a vast knowledge upon coal, and our civilization recognizes it as the material energy of the country,—the universal aid, a factor in everything that we do.

Without coal we would have to resort to water and wood for the power needed. This thought is certainly good evidence of the stability, permanence and vital importance of the coal mining business. What should be the most attractive thing about it is that the element of speculation is entirely eliminated.

The coal seams can usually be located for miles with outcrops in various places, whereby actual knowledge can be gained of the thickness of the vein and the quality of the coal, thus leaving no uncertainty about it, and with our giant industries, continually enlarging, surely sufficient earning power can be shown, both present and future, to eliminate all suspicion and question.

Besides and in addition, the coal resources of Europe are becoming depleted. The world is looking to this country for its supply of coal. There never has been a time that presented a brighter outlook, founded upon more solid conditions and more favorable to us, than is enjoyed by the export coal trade of this country at the present time. This will leave a broader and larger market at home for our product.

John W. Boileau.

Foldout Placeholder

This foldout is being digitized and will be inserted at a future date.